Building Services News

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H & V News

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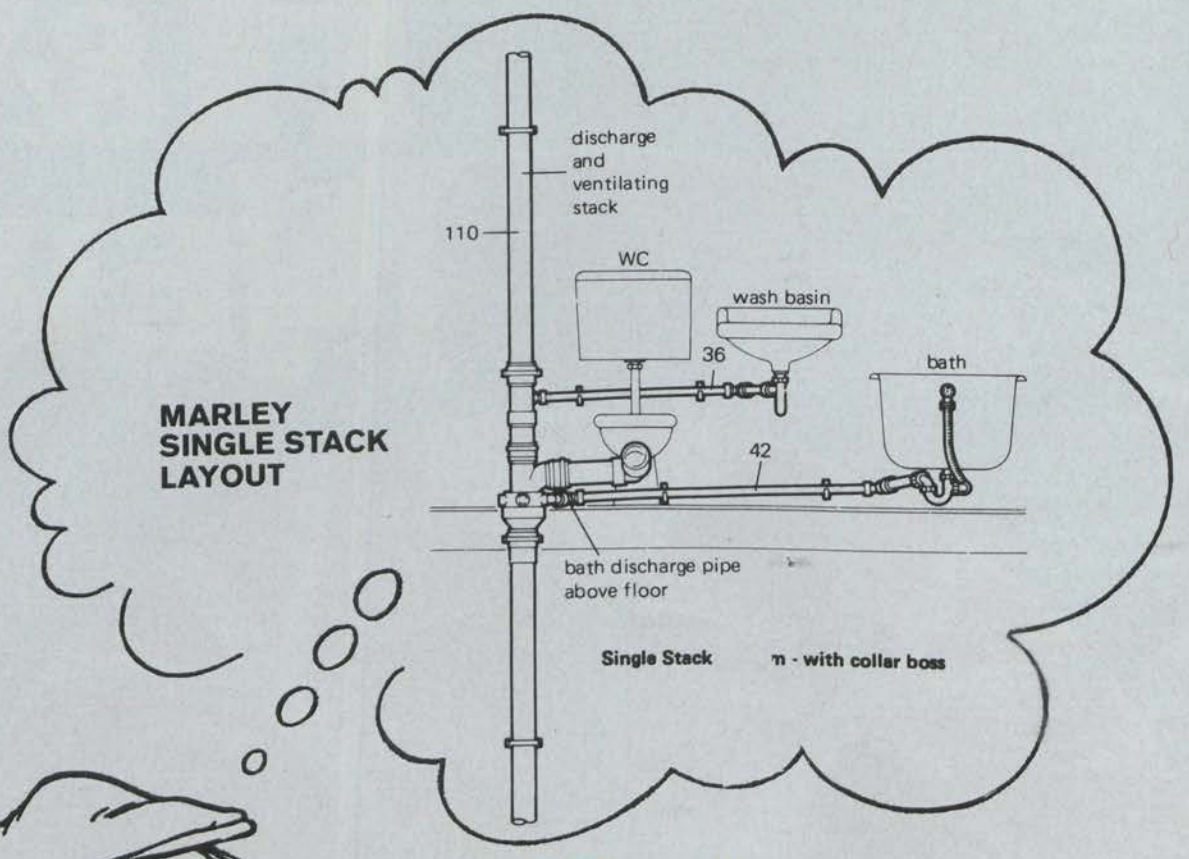
MARCH 1980

IRELAND'S BUILDING SERVICES MAGAZINE.

- Indigenous Fuels Seminar
- Solar Energy — Domestic Heating
- BTU Golf Dates
- CIBS Seminar



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H&V NEWS

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IN THIS ISSUE

NEWSDESK

£12m US Order for Waterford Ironfounders

Waterford Ironfounders the TMG Group subsidiary have recently closed an export order to the United States and guarantees a minimum order of 100,000 stoves from Waterford Ironfounders over five years. The deal has been done with a St Louis company, Capital Coal and Coke. Details were hammered out by Declan McCourt, chief operating officer of TMG.

McCourt explains the deal: "We have signed a five-year distribution agreement. Capital Coal and Coke will take a minimum of 100,000 cast-iron stoves over five years and distribute them east of the Rock-

Declan McCourt.

ies. Our own man Stephen O'Sullivan has pioneered the West Coast and has had a very successful twelve months. The deal is worth $35m at present-day prices. Capital Coal and Coke are locked into those quantities. We have flexibility on pricing".

The deal means jobs for an extra 75 people at Waterford Ironfounders. It means extra capital investment in the foundry of £1m, bringing total recent investment there to £1.6m. Research and development work is strong at Waterford and McCourt reckons that they now have a good product mix.

The next thing is to get a good geographical spread. The Continental Europe market will be attacked next. Turnover at Waterford in 1979 was about £10m or roughly 20% of total turnover.

Bid For Armitage Shanks

At the time of going to press news has been released of a bid by the Blue Circle group for Armitage Shanks Group Ltd. The offer was in the order of £28 million. It appears likely that this takeover will go ahead but at the last minute a counter bid was also received and the final decision will be made on the 21st Feb.

Blue Circle and Chadwicks Ltd are closely linked.

New 'Clear Air' Standards Adopted

The main decision at a recent meeting of the EEC Environment Ministers was the adoption of a Directive by which limits are fixed for the levels of sulphur dioxide and suspended particulate matter in air to be observed by the member States in the interests of safeguarding human health. This measure had been under consideration for several years and a previous Council had failed to agree on it. The Council succeeded in resolving the large number of outstanding problems and it was agreed that the proposed standards should become operative from 1 April, 1983 with provision for an extension to 1993, at the latest, for areas having special difficulties.

In the light of the recent increase in the use of solid fuel heating this may have a significant influence on the type of fuel burned and the type of burner or fire used.

Lister Scholarship

Picture shows presentation of a cheque, on the Lister Stand, at the Enquip Exhibition, RDS, by Mr John English, Director, Lister Group (right) to Dr Evan Petty, Dean of College of Engineering and Science, National Institute of Higher Education in Limerick. The cheque is for the first year of a 4 year scholarship at the NIHE Limerick, valued at £750 per year, for prospective students of Mechanical Engineering, in respect of the college's 4 year Degree Course. Speaking at the presentation, Mr John English said that the scholarship was an indication of Lister's commitment to training, as Ireland's largest engineering group.

Runtalrad Extension

Mahon & McPhillips (Construction) Ltd. have secured the contract for the erection of an extension to the Runtalrad factory in Thomastown, Co. Kilkenny.

The value of the contract is in the region of £70,000.

Architects: R. & W. Cunningham, Waterford.

Consulting Engineers: Nicholas O'Dwyer & Partners.

Bord Gais Contracts

Murphy International have been awarded two major contracts for above ground pipelines and installations in the Cork area by Bord Gais Eireann, Cork.

The first award involves two installations including filtering, heating, pressure reducing, heating facilities and associated pipeline construction at the Little Island Development area.

The second award involves two gas installations and associated pipeline construction in the Lough Mahon Industrial Development Area.

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Party of Irish Builders & Plumbers Merchants whom Chloride Shires Ireland invited to visit the Shires stand at the recent Interbuild Exhibition, Birmingham. Pictured is Brendan Whooley Director Chloride Shires Ire. (4th from right back row) who led the group assisted by Tony Hackett and Donal O'Leary Shires new Sales Representative based in Cork. David McCarthy, Heating & Plumbing Centre, Cork and Jackie Coyle, Hynes Ltd., Galway are not included in this picture as they returned on a different flight.

Saving it in Sweden

City authorities in Sweden are to take the lead in building energy-saving houses designed to more than halve power consumption.

But in order to see the project through, the city of Uppsala will have to grant itself exemption from some of its won building regulations.

Described as "a practical experiment with new civil design methods", the 16-house estate will have one common heating plant, using return water from a nearby district heating system.

Flat plate solar collectors provide extra heating capacity during the summer. The houses are also massively conservation-conscious, being quadrupled-glazed, highly-insulated, and having a minimum air exchange incorporating air filters.

Most services in Swedish homes have to be laid very deep to avoid the danger of winter freezing. But in the Uppsala scheme, the services are only 800mm below the surface and protected from freezing by being in the same trough as the heating pipes — a method officially in defiance of the regulations.

Death of Donal McGonnell

Without doubt the greatest shock of the year was the sudden death of one of the industry's best known personalities, Donal McGonnell. Donal had for many years been associated with pumps and engineering through H R Holfeld Ltd, where he held the position of Sales Director. He had helped to establish Holfelds not only in Ireland but, through various trade delegations, in many parts of the world especially in the Middle East. His death will be a great loss to Irish industry in general.

IDHE Set for Lively UK Conference

June the 4th promises to be a vitally interesting day for delegates to this year's Conference of the Institute of Domestic Heating and Environmental Engineers in London. The Conference - entitled 'Strategy For Survival' - will be examining the techniques available and the organisation to ensure continuing and greater prosperity throughout the industry.

Speakers representing contracting, manufacture, merchants, fuel, consultancy and education will be discussing ways of creating a greater demand for good environmental engineering — and how to satisfy that demand profitably.

John Beer, National Organiser Home Heating Group, HVCA will look at the role of the contractor as the ultimate link with the end user. Ron Ayers, Director of the HEVAC Association will examine the responsibility of the manufacturer towards specifiers, purchasers and operators. An invited speaker from the Builders Merchants Federation will analyse the merchanting link in the environmental engineering industry.

Engineer/Journalist Mike Newth — a regular contributor to the trade press and one time editor of well known trade journal — will be giving guidance on the all important aspect of Communication — an undiscovered art for many organisations.

In a Symposium session the frequently maligned fuel industries will each be represented by a well known speaker. For solid fuel Laurie Penzer, Deputy Director General of Marketing and Director of Sales, National Coal Board. For Electricity Harold Smith, Head of Domestic Section, Electricity Council. For Oil David T[illegible] Senior Engineer, Gas, Oil and Kerosine, Shell UK Ltd and a member of Dobeta. Together with an invited representative of British Gas.

The full programme for the Conference will be announced shortly and copies of the delegate registration form available from the Institute. Meantime the Institute are making a special offer to delegates who book early, a 10% discount for all places reserved and paid by the 30th April.

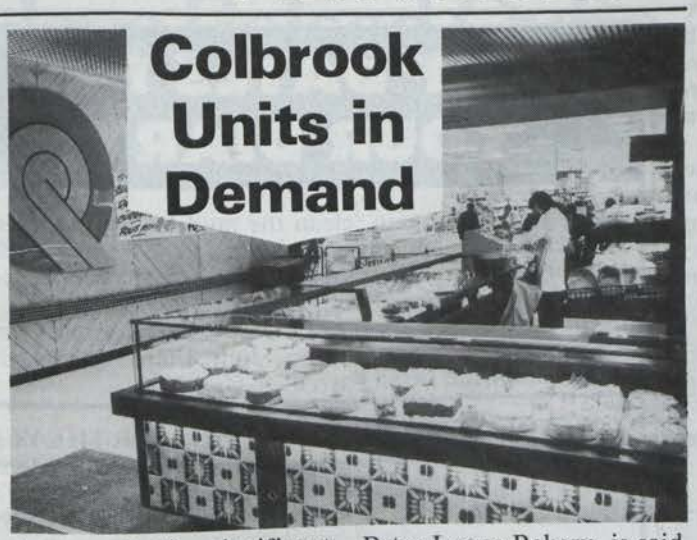
Delegate fee for the Conference is £40.00 (£35.00 for IDHE and D.H.S. members). Book early and this will cost £36.00 and £31.50 respectively — almost the same as last year! Delegate fee includes conference attendance, morning and afternoon refreshments, aperitifs and lunch including wine, together with a copy of the conference papers and documentation. All fees quoted are in £'s sterling.

The Conference will again be held at the venue which proved so popular in 1979 — the Marine Engineers Conference Centre, Mark Lane, London EC.

Full details of the Conference may be obtained from:— Institute of Domestic Heating and Environmental Engineers, 93 High Road, Benfleet, Essex. Tel: Benfleet 54266. The local IDHE branch will be having their own conference in 1981.

At a handing over ceremony in Weatherglaze recently, a cheque for nearly £3,000 was presented to Concern. The money was raised through a staff collection and their contribution was equalled by the Management. Our picture shows (L-R): Mr. Charles McKeon, Chairman Weatherglaze Ltd; Christy Keller, site manager; Alex Tarbett, Executive Director Concern, and Tommy Ward, charge-hand Weatherglaze Ltd.

NEWSDESK



Colbrook Units in Demand

As a result of a significant increase in sales at their outlet in Quinnsworth of Dundalk since the installation of Colbrook refrigerated display cabinets, Peter Lyons Bakery has decided to standardize on Colbrook equipment at all its other outlets.

Peter Lyons, Director of Peter Lyons Bakery, is said to be pleased with the Colbrook cabinets which were installed a year ago by Cross Refrigeration Limited, the sole agents for Colbrook in Ireland.

Photograph shows the display cabinets currently operating so successfully at the Dundalk Quinnsworth.

IIRS Conference on Wider Use of Coal

The importance of coal as an alternative fuel for industry will be investigated in a two-day conference planned for the end of next month by the IIRS and the National Board for Science and Technology.

Coal cost and supply and recent technological developments will be appraised at the conference which will be held at Trinity College, Dublin on March 25 and 26.

Also associated with the conference are the main engineering bodies, the Institution of Engineers in Ireland and Association of Consulting Engineers of Ireland.

New Irish Distributors for 'PoLadaire'

Porter-Lancastrian have appointed Cool Products Limited of Belfast sole distributors of 'PoLadaire' OPEN—Type Compressors and Condensing Units in Northern Ireland. The company will also serve the Republic of Eire. A full range of 'PoLadaire' units and spares will be carried. 'PoLadaire' spares are fully interchangeable with the equivalent Frigidaire parts and, following the purchase of the rights to manufacture Frigidaire 'OPENS' from General Motors 'PoLadaire' is now the sole supplier. Cool Products, although established just over a year ago, is now the leading wholesale refrigeration company in Northern Ireland. The company is a member of the J Norman Fulton Group who were previously official distributors in Northern Ireland for Frigidaire OPENS.

Further information, including literature on 'PoLadaire' OPEN refrigeration equipment, is available from Cool Products Limited, Balmoral Road, Balmoral Industrial Estate, Belfast BT12 6QD. Telephone: 66-4935.

NEWSDESK

CIBS Seminar

The Republic of Ireland Region of the CIBS held a very successful seminar on the 'Use of Energy in Buildings' in the Irish Management Institute late in January. The purpose of the seminar was to examine the implications of the recently published CIBS building energy code in order to reduce the energy requirement of new and existing buildings.

Speakers included Jack Peach, Technical Secretary CIBS, Brian Roberts, Hugh Klein and Sean Mulcahy, with subjects varying from modifying the building envelope to recent studies.

The seminar was well attended and in fact over 60 delegates turned out for what was a very informing day.

On the platform at the CIBS Seminar were L-R Seamus Honan, P. Piggot and Sean Mulcahy.

At the CIBS seminar were L-R Seamus Honan, (Chairman CIBS), Jim Rogers, (Vice Chairman CIBS), Michael Buckley, (Secretary CIBS), and speakers Jack Peach and Brian Roberts.

Successful RSL Lecture

RSL Ireland Ltd had a very successful evening lecture in Sachs Hotel, Dublin on the 14th February. Over 80 installers, Students and end users from the refrigeration industry turned out on what was a 'bad night' weatherwise. The lecture was delivered by Mr. U. Schmitz of Kuba, West German Manufacturers of coolers and condensers and was entitled "Problems with Air Coolers and Air-Cooled Condensers".

Many new aspects of refrigeration and related subjects were revealed and it is hoped to publish the paper in full in a future edition of H & V News.

GOLF DATES FOR YOUR DIARY

Ah its that time again, clean the mud from the spikes on your golf shoes and press the tartan trousers, yes its BTU Golfing Society Time. With a new captain for the year, Peter Johnston, the committee is as follows:
Eddie Egan, Secretary, Des O'Gorman, Treasurer, Committee members, Liam Stenson, John Ennis, Des Bindley, Tony Gillan and Brian Farrell.

BTU GOLFING SOCIETY OUTINGS FOR THE YEAR

Date	Day	Venue	Sponsored By
March 18	Tuesday	Royal Dublin GC	H & V News
April 17	Thursday	Newlands GC	Veha
May 22	Thursday	Delgany GC	B & E Boilers
June 16	Monday	Woodbrook	Pump Services
July 24	Thursday	Castle GC	Lister Tubes
August 25	Monday	Dun Laoghaire GC	BSS
October 2	Thursday	Hermitage GC	Clyde Systems
Captains Day			
October 21	Tuesday	Clontarf GC	Burmah-Castrol
November 28	Friday	Hermitage GC	Christmas/ Ladies Night

As you are reading this wouldn't it be a good idea if you put the dates in your diary now so that your business appointments don't clash with your golf. H & V News are sponsoring the first outing of the year, could that have anything to do with the fact that VG has finally got himself a set of clubs?

News in Brief

The heating and air conditioning control system for the new E.B.S. second phase office development at Westmoreland Street, Dublin is being supplied by Temperature Control Services Limited. Under a package deal contract T.C.S. will supply, supervise and commission the complete system using Swiss-made Staefa control equipment. They will also manufacture the heating and air conditioning control panels.

• • •

Our best wishes to **Tim Harrington**, Director of the CIF, for a speedy recovery from his recent illness, may he be soon back at the helm in Leeson Park.

• • •

Wilo Pump Ltd, who have almost completed their factory in Limerick where they will make domestic circulators for the German market, are to consider marketing their product on the Irish market through a subsidiary company **Wilo Engineering.**

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Our Air Handling Units Have Raised Quite A Few Eyebrows

And that's quite something, since companies and institutions like I.C.I., Leyland, Shell, Debenhams and the Royal Navy aren't usually taken by surprise. But then again, it's not every day that someone comes up with an air handling unit which meets their exacting demands right down to the last detail.

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Largest Flowmeter in Ireland

I.I.L. The Instrument People are to supply a 60 inch Flowmeter for the New Ballymore Eustace Liffey Adquaduct Scheme. This is believed to be the largest Flowmeter ever ordered in the country. A Fischer & Porter "Mag X" Electromagnetic unit is being supplied. This all European meter will be manufactured in England and calibrated and tested in Germany. Over the last twenty years the Magnetic Flowmeter has established itself as the most popular flow device for water and waste application. Its advantages over other flow devices are obvious. It is immune to viscosity or density variations and completely unaffected by solids in suspension or larger pieces of debris passing through it. It is easy to install in the line and once in operation requires virtually no maintenance. It is a truly obstructionless device providing no more pressure loss than a straight piece of pipe. The Mag X unit being

A Fischer & Porter "Mag X" electro-magnetic unit.

International Shows 1980-81

The following are dates of shows available at the time of going to press.

INTHERM	Stuttgart	25-29 March 1980
HEVAC	Birmingham	19-23 May 1980
SANITAIR & HYGIENE '80	Amsterdam	3-7 June 1980
BUILDING PRODUCTS & SERVICES & GRAHAM EXPO	Olympia	15-19 June 1980
ENERGY SHOW	NEC	24-26 June 1980
HOME IMPROVEMENTS	London	29 Sept-5 Oct 1980
ARAB BUILD '80	Bahrain	9-14 Nov 1980
SHK '80	Hamburg	19-22 Nov 1980
INTERNATIONAL HEATING, AND AIR CONDITIONING	Utrecht	16-21 March 1981
INTERPLUMB & HEATEX	London	Spring 1981

INTERNATIONAL HEATING, REFRIGERATION AND AIR CONDITIONING — Utrecht — 16-21 March 1981

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supplied in this application has four advantages over the conventional Magnetic Flowmeter. Energy requirements are reduced by as much as 75%. This is of special value to-day when power resources are limited and costs continue to rise. Installation expenses are drastically reduced. The Mag X system requires only a single conduit interconnection between Flowmeter and signal Converter. This unit will have zero stability established at the time of hydraulic calibration and the need to stop flow and verify zero stability has been eliminated. As in all Mag X Magnetic flow meters this instrument will offer + 1% of rate accuracy on both digital and analogue outputs. Delivery of this mammouth unit is scheduled for Summer 1980.

Aspects of Domestic Space Heating — Part 111

In the November-December issue of this journal, the results of some of An Foras Forbartha's research work, relevant to domestic space heating, were presented. The main developments taking place at present which affect domestic space heating are:

- **improvements in fabric insulation levels**
- **a switch from oil to solid fuel as the main heating fuel.**

These developments are likely to continue in the immediate future. This article will outline some of the implications of the data presented in the earlier issue for these two developments and suggest some actions at the national level to help ensure that optimum levels of energy use are achieved. Before dealing with these two specific areas however, I will briefly consider the likely temperature regimes in Irish housing in the future.

Temperature Levels in Domestic Buildings

Most proposals regarding measures to improve thermal performance and conserve energy assume the desirability of relatively high average house temperatures, for example 17° - 20°C. Sometimes the ability to achieve high temperatures appears to be confused with the maintenance of temperatures at this level. Northern European countries in general accept the desirability of high average temperatures and indeed achieve these in their current housing stock. However, the temperature pattern in existing Irish housing is quite different. Clearly some temperature levels measured were undesirably low, but is the typical level measured in centrally heated houses acceptable? Should increases on this be encouraged or discouraged? If relatively high temperatures with little variation in location and time are to be maintained then future directions in housing would seem to be towards high degrees of insulation, tight construction with reduced air infiltration, and possibly mechanical ventilation, and highly efficient heating systems with sophisticated controls. However if average house temperatures of 15°C - 16°C, with comfort temperature maintained in occupied areas only, are considered more desirable, the emphasis must also be placed on flexibility of operation, speed of response, efficiency over a wide range of use patterns and ability of structure and heating system to accept a wide range of operating regimes without damage or deterioration.

It can easily be shown that an increase in average house temperatures of 1°C will increase fuel consumption by some 10% or more in the majority of Irish houses — all other factors being held constant. Thus, movement to high overall house temperatures carries a considerable penalty in terms of energy use. Irish housing consists, in the main, of single family houses with partial and intermittent use patterns. Given the relatively mild winter climate enjoyed here, partial and intermittent heating should be satisfactory and whole house continuous heating should be discouraged. In the remainder of this article, the continuation of partial and intermittent heating will be assumed with an average whole house temperature of the order of 16°C being considered satisfactory. It is clear from the data presented that even this temperature level is not achieved in many houses at present.

Building Fabric

As far as building fabric is concerned the data in the previous article highlighted two characteristics. Existing Irish housing has , in general, a low level of thermal insulation in all fabric elements. However in recently constructed housing a significant improvement can be noted. This suggests that there are two key questions to be answered:

(i) What should be done regarding existing poorly insulated houses?

(ii) Are current insulation levels for new housing satisfactory?

Before considering these questions, some general observations on the effects of insulation may be useful. Because of the typical heating patterns employed in Irish housing the following can be stated.

- Insulation will have a different effect, depending on the part of the building in which it is placed, since the temperature difference across the building element will vary with location.

- Since the temperatures in the unheated parts of the house are determined in the main by a balance between the temperature of the heated part and the external temperature, with the building structure itself acting as the balancing or controlling agent, significant changes to the insulation value of the fabric of the building will alter the temperature in the unheated portion. Generally, an improvement of the insulation level will increase the temperature in unheated parts of the house.

- In so far as the temperature regime maintained is a function of the householder's ability to pay, then, since the effect of insulation is to provide any given level of heating at less energy use and therefore lower cost, there will be some tendency on the householder's part to increase temperatures.

The standard method of calculating energy savings resulting from added insulation assumes a constant temperature difference maintained across that building element. Such calculated savings can be considered to be the potential savings from insulation. Based on some theoretical studies, and on limited measured data from the United Kingdom, a ratio of

Aspects of Domestic Space Heating - Part III

expected savings to potential savings, as outlined in Fig. 1, has been suggested by the present author. This suggests that for an average house temperature of 10°C no actual energy savings would occur, whilst for an average temperature of 19°C the full calculated savings would occur. For the average non-centrally heated house and centrally heated house, 33% and 60% respectively of the calculated savings would occur.

A study on conservation possibilities in existing houses using this assumption regarding the effects of insulation suggested that the rate of return one could expect on various conservation measures would be as set out in Table 1. These rates of return were calculated using March 1979 prices. They understate somewhat the rates currently achievable since energy prices have increased at a significantly faster rate than construction prices since that time. The low rate of return from measures in non-centrally heated houses is directly related to the low temperature maintained in such houses. Typically these houses employ inefficient heating systems and a comprehensive approach to ensure adequate temperatures and efficient energy use is required. This will be referred to again later.

As far as new housing is concerned similar analyses (using the same assumptions) will justify very high levels of insulation in all elements. It is usually assumed in such analyses that insulants can continue to be added to the basic construction at a marginal extra cost equivalent to the cost of the insulation. The validity of this assumption is open to question. The addition of more than 100 mm of insulant on the attic floor may create difficulties regarding the use of attic space (through obscuring the positions of the joists on the attic floor) and the effective ventilation of the attic. The addition of more than 50 mm of insulation either in the cavity of cavity walling or in the form of internal lining to external walls leads to similar difficulties. In the former case a cavity width of greater than 50 mm is required while in the latter the required support studs for the insulation are so large that the logic of the construction must be called into question. A building consisting of a structural frame (with the insulant supported on the frame) and masonry or other cladding may be more realistic.

In summary, typical existing constructions can provide roof U-values of 0.4 W/m^2°C and wall U-values of 0.6 W/m^2°C through the addition of insulation. Additional insulation is cost-effective if it can be provided without an extra cost being incurred in modifying the structure. In this situation there is clearly need to consider how this extra insulation might be provided.

Heating Systems

The previous article showed that the majority of existing houses is not centrally heated. However central heating was becoming the norm for new housing prior to 1973 and, despite a reduction in popularity after the rapid rise in oil prices in 1973/74, has become a standard feature of private speculating housing again by 1978. The major difference from 1972 was that, in 1978 solid fuel is fast catching up on oil as the most popular fuel for new central heating systems. Developments since have reinforced the position of solid fuel. By 1979, 37% of new housing in this category had solid fuel central heating and a further 18% had dual oil/solid fuel

Energy Conservation Measures	Range of Internal Rate of Return (%) Average Internal Temperature 15.5°C	Average Internal Temperature 13°C
Space Heating		
1. Install 50 mm attic insulation - none existing	28 to 43	13 to 23
2. Additional 50 mm on 1 above - installed at same time	8 to 11	2 to 5
3. Install 50 mm attic insulation - 25 mm existing	10 to 12	3 to 6
4. As 1 - "Do-it-yourself" cost	34 to 52	16 to 28
5. As 2 - "Do-it-yourself" cost	10 to 14	4 to 7
6. As 3 - "Do-it-yourself" cost	11 to 15	5 to 8
7. Install secondary windows	1 to 2	negative
8. As 7 - working - living areas only	3 to 5	0 to 2
9. As 7 - "Do-it-yourself" cost	2 to 4	negative
10. As 8 - "Do-it-yourself" cost	4 to 7	1 to 3
11. Urea-formaldehyde foam cavity fill to existing cavity walls	15 to 19	9 to 11
12. Internal insulation (dry-lining and 25 mm insulation) to existing single-leaf walls	3 to 5	0 to 2
13. As 12 - working - living areas only	4 to 7	0 to 4
14. Weather-strip doors and windows	10 to 15	0 to 8
15. As 14 - "Do-it-yourself" cost	25 to 32	9 to 19
16. Comprehensive air-tightening package include weather-stripping, caulking of air-gaps, porches at external doors and kitchen extract fan	-1 to 2	negative
Water Heating		
17. 80 mm lagging jacket to hot water storage cylinders	77	77
18. As 17 - "Do-it-yourself" cost	135	135
19. Back boiler to solid fuel room heater (for houses with solid fuel space heating and electric immersion hot water heating)	15	15

Table 1: Range of Internal Rate of Return (%) for selected Conservation Measures applied to 4 house types.

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systems.

As already pointed out continuous whole house heating is not necessary or desirable in Irish housing. In the light of information on typical use patterns, the following can be identified as the major temperature requirements likely to be experienced.

- A minimum air temperature of greater than 10°C at all times
- Temperatures in the region 17° - 20°C in living areas and work areas for much of the day
- Temperatures in the order of 20°C in bedrooms. These will generally be required for short periods only and seldom in all bedrooms at the same time.

On average whole house temperatures of some 16°C is considered a likely outcome from meeting these requirements. Heating systems, while being able to meet traditional design conditions, must be able to provide the likely temperature requirements with a high degree of efficiency.

It is widely believed that gas-oil, the major fuel used for central heating up to the recent past, can no longer be considered as a contender in this market in the future. Likewise electricity cannot be considered likely to become the main source of domestic heating in the future. Off-peak electricity may make some contribution, but the electric heat pump, which is the most likely way in which electricity will provide a significant portion of domestic heating, is unlikely to be in widespread use for some years. Thus, unless natural gas becomes more freely available, there remains little alternative to solid fuel for domestic heating in the future. As has been noted, the trend in this direction is well underway. In this respect we differ from the majority of Western European countries where natural gas for space heating is common.

If solid fuel is to be the main fuel for domestic space heating it is worth considering how this fuel is to be used. Solid fuel almost definitely means coal in this context. Peat supplies are limited and likely to remain so in the immediate future. "Short rotation forestry" has been put forward as a fuel source for this purpose but its use will probably be limited to rural areas. In addition it will probably be some years before any significant contribution can be expected from this source. Coal for space heating can be used in individual room heaters, as central heating at the individual house level, or in the form of communal or district heating. As has been seen individual room heating has been the norm in the past. However the greatest dissatisfaction and lowest overall house temperatures are associated with individual room heating by open fire. This form of heating in one or more rooms is unlikely to be acceptable in the future. If acceptable to householders it would represent a return to the least efficient form of heating — something which is nationally undesirable. Individual room heating by solid fuel can only be carried out efficiently in a closed appliance where the draught is tightly controlled. To provide sufficient flexibility and a satisfactory level of heating more than one such unit would be required. A single combustion unit with an associated system of heat distribution to the various areas of the house would be less labour intensive and more flexible in use. For the typical house types and use patterns

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currently found in this country a closed appliance incorporating a boiler and using water as the heat distribution medium would seem most appropriate.

Solid fuel, since it cannot be instantaneously switched on and off, is far less flexible than oil or gas. On the other hand, the efficiency of a solid fuel fired boiler does not drop off with reducing load. It will operate efficiently in a situation of varying load, although it will be considerably slower than an oil or gas system to respond to this variation. One method of improving this response may be to incorporate in the system a small heat store e.g. a well-insulated water cylinder, which could provide the initial rapid response to a sudden increase in demand. This store could be replenished at times of low demand. While solid fuel heating is inevitably more labour intensive than oil or gas fired heating, an efficient closed unit in a reasonably well insulated house should consume no more than 12 kg of coal per day on average. This does not imply a very high degree of labour intensity. In summary, a solid fuel central heating system conforming to the following principles should prove satisfactory.

- An efficient closed combustion unit incorporating a boiler. This may or may not be designed as a room heater. Maximum output in the range 7-15 kW should be sufficient for typical well insulated houses.
- A control sytem which maintains a minimum house temperature of some 12°C and which incorporates a time control for intermittent use.
- A heat stove or alternative auxiliary system to ensure rapid response to sudden increases in demand.

Such a system should provide an adequate heating level efficiently and effectively. There are other considerations involved in the use of solid fuel at individual house level, e.g. air pollution, which must be considered but are outside the scope of this paper.

The third method of using solid fuel to provide domestic space heating i.e. communal or district heating solves all of the problems associated with solid fuel at the individual house level but introduces another range of problems. These are largely economic and administrative in nature and will not be considered further here.

If solid fuel central heating for individual houses is to be adopted and prove satisfactory certain steps need to be taken at the national level immediately. Among these are:

- The introduction of a system of testing and approval of all combustion units being marketed for domestic heating applications. This is particularly important since, as already pointed out, we differ from many Western European countries in that we plan to use solid fuel as the main fuel for domestic heating. We cannot therefore rely on suitable standards being set and maintained by countries from which such units might be imported. In addition a native test and approval scheme would considerably help in maintaining standards of home-produced units and in ensuring their acceptability to the industry as a whole. This system should cover both the construction and

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efficiency in operation of the units.

- Steps to ensure the continued availability of the necessary quantity and quality of solid fuels. This would involve among other things, national standard specifications for the various grades of coal required.
- The publication of a code of practice relating to the installation of efficient solid fuel central heating systems in domestic premises.

The need for a comprehensive approach involving the improvement of both fabric and heating systems, in order to ensure adequate temperatures and efficient energy use, in existing housing has been referred to earlier. Despite some wishful thinking to the contrary, rapid results in terms of energy conservation in existing housing cannot be ensured without significant capital expenditure on a comprehensive programme involving improvement of both heating systems and insulation. The nature and extent of such a programme cannot be determined on the basis of simple cost-effectiveness analysis alone. However, as new housing built to higher insulation standards and incorporating efficient heating systems becomes a significant proportion of the housing stock, there will emerge two classes of housing (in terms of their heating costs), if nothing is done to upgrade the existing stock. This, together with the uncertainty regarding future energy supply and prices, suggests that a programme of upgrading over the medium term (10 to 20 years) should be commenced immediately.

Patrick J. Minogue

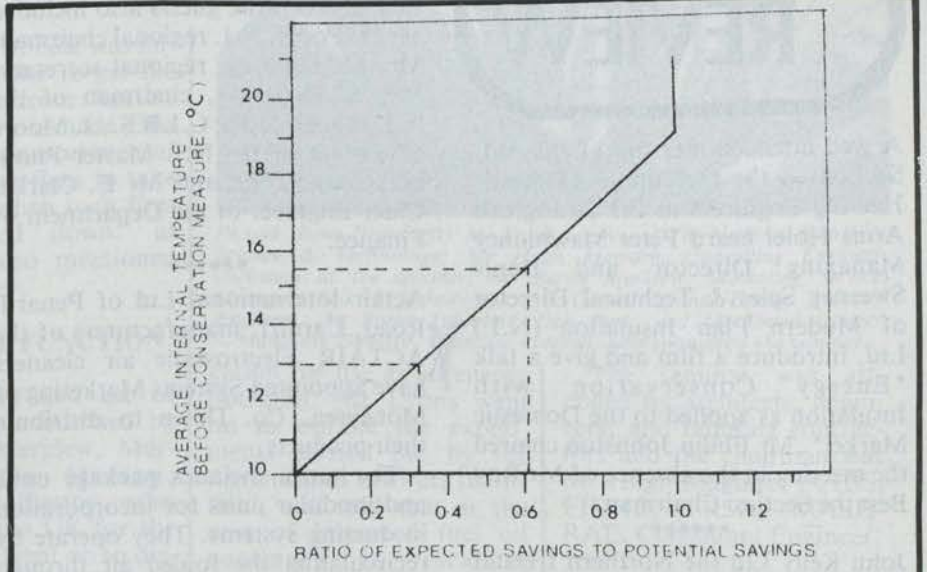

Fig 1 : Relationship between expected savings and average internal temperature.

NORTHERN IRELAND REVIEW

A well attended meeting of the N.I. Section of the Institute of Domestic Heating Engineers in the Strangford Arms Hotel heard Peter Mawhinney Managing Director and Denis Sweeney Sales & Technical Director of Modern Plan Insulation (N.I.) Ltd. introduce a film and give a talk "Energy Conservation with Insulation as applied to the Domestic Market". Mr Philip Johnston chaired the meeting in the absence of Mr Roy Best the Section Chairman.

******

John Kelly Ltd the Northern Ireland Fuel Importers & Distributors & Heating Merchants have announced the appointment of Mr F.R. McBride, M.B.E. to the Board of Directors of the company.

Mr. McBride who is well known in the heating industry is a Director of IES Industrial (Ireland) Ltd, Chairman of the N.I. Energy Managers Group, Hon Secretary of the N.I. Section of Institute of Energy and is on the Committee of the N.I. Branch of the Institute of Mechanical Engineers and of the N.I. Branch of the C.E.I.

Mr. McBride will head a new Fuel Technology Department for the Kelly Group. This Department will service industry and commerce on matters of fuel technology and energy utilisation.

******

Heating Controls & Devices Ltd. local sales and service agents for BRADLEE steam package boilers has announced that three new models have been added to the range.

The three models of 2,500 lb/hr, 3,00 lb/hr and 3,500 lb/hr with pressures from 55 to 150 psig are thrice pass return flame wet back boilers, oil or gas fired and to BS2970

Full details of the boilers are available from H.C.D. Carrowcagh Road, Dundonald, Belfast. Telephone: Dundonald 5111.

******

Mr Jim Moore of Ballymena has been elected president of the Northern Ireland Master Plumbers Association in sucession to Mr Dennis Stothers.

******

A recent visitor to Belfast was Geoffrey Cutting, national director of the Heating & Ventilating Contractors Association. The members welcomed Mr Cutting at the Stormont Hotel Belfast when the guests also included Mr D. Poole, N.I. regional chairman, Mr. M. Huntley, regional secretary, Mr. S. Ferguson, chairman of the N.I. branch of the C.I.B.S., J. Moore Chairman of the N.I. Master Plumbers Association and Mr E. Clarke, Chief Engineer of the Department of Finance.

******

Actair International Ltd of Penarth Road, Cardiff, manufacturers of the ACTAIR Electrostatic air cleaners have appointed Systems Marketing of Moneyrea, Co. Down to distribute their products.

The range includes package units and modular units for incorporation in ducting systems. They operate by recirculating the fouled air through high voltage collector cells which removes the particles of pollution.

******

Hunter Plastics Industries have launched through their Northern Ireland Distributors W.H. Martin Plastics Ltd. Mallusk, Newtownabbey, the first complete plastic hot and cold water system.

The material used is chlorinated polyvinyl chloride and the Hunter Genova PVC systems are available for 15mm and 22mm diameter pipe with a full range of fittings plus additional fittings for connection into copper, stainless steel and galvanised systems.

This is an American development where it is already well established and where it has received the necessary trade certificate of approval.

******

The Ulster Energy Working Group of the Royal Society of Ulster Architects have chosen the title "Energy costs are Soaring" for their next seminar to be held at the end of March in the New University of the Ulster. Subjects to be included among the papers of the two day Seminar include "Principles of Heat loss, Insulation, Materials and Application, Thermal Controls, Ventilation and Condensation. Further details are available from the R.S.U.A. office at 51 Malone Road, Belfast, BT9

******

His many friends in Northern Ireland wil be pleased to see that one of the regular visitors to the Province over the years, Mr. Gordon Ruxton has been appointed a divisional director and also appointed to the executive board of Flakt, The British owned subsidiary of AB Svehska Flaktfabriken the international air conditioning equipment and manufacturers.

******

One must be getting near to an announcement that the Heat Pump has made it.

This "on-off" invention appears to be now getting near the commercial stage.

The most recent advance announcement has been, that, indicating that the Northern Ireland Electricity Service have two units on test in what can be described as two normal dwellings. There tests will enable the Board to produce hard facts based on true pracitcal applications.

Over the last year at least three companies have gone into local production, in addition to which a member of local companies have taken on agencies or the distributorships for units of either British or Continental manufacture.

Rising energy costs, have created a situation whereby many "alternative energy or heat sources" have been commercially attractive and it is possible that the heat pump may fall into that category.

The Energy Unit of the New University of Ulster have played a prominent part in developing and promoting the application of the heat pump and it would be a rich reward for Dr. McMullan and his team if the Heat Pump "too off" in Ulster.

******

Coleraine and Londonderry were the two bases chosen by Conoco Ltd for two trade evenings for distributors, customers and of course potential clients.

The main speaker at each of the evenings was Mr. D. Hackett, Deputy Managing Director of Conoco who spoke of the World Energy Situation. Those who attended not only heard Mr Hackett give an appraisal of the current supply position but also heard his views on the future and the obvious need for conserving the worlds petroleum supply.

******

Mr D. Dorman has joined IES Industrial (Ireland) Ltd of 21 Station Street, Belfast.

Mr. Dorman has had considerable experience in the instrument field and will concentrate on the instrumentation and hospital side of I.E.S.'s activities.

'No Oil for Domestic Use in Next Decade'

Picture shows (from left): Mr Frank Lunny, of The National Board for Science & Technology; Mr Hugh Maguire, Consulting Engineer, chairman of the seminar; Mr Barrie Meridew, Marketing Services Manager, Selkirk Metalbestos; Mr Gerard Lyons, Energy Research Engineer, An Foras Taluntais, Oak Park, and Mr David Couper, Managing Director. Grantaid Limited, who sponsored the seminar.

The use of both turf and wood (by means of short rotation forestry) as an alternative source of energy replacement for oil and electricity for domestic use was discussed at a recent seminar in Dublin on "The Use of Indigenous Fuels". Mr. Frank Lunny of The National Board for Science & Technology said that by 1990 oil fired central heating will have disappeared and that, at present prices, turf is a more economical fuel for domestic cooking and heating than electricity. However, he went on to say that this depended on the design and management of the appliance chosen. The maintenance of a glowing firebed and addition of fuel in small increments was necessary when using turf, and it is easier to achieve this in closed appliances rather than in open fires.

TAKEOVER

"Closed room heaters can be three or four times as efficient as open fires", said Mr Lunny, "and these appliances will gradually take over."

With reference to the most efficient use of turf or wood in solid fuel heaters, David Couper, Managing Director of Grantaid Limited explained the difference in moisture content of various types of wood and described the best method to obtain optimum results from indigenous fuels for heating in central heating cookers, such as the ideal wood, size of logs, etc.

"Storage of fuel is also most important", said Mr Couper "and ideally wood should be stored in a dry area under cover". When using coal or anthracite, he stressed that the use of a uniform size of coal was important in order to get the best results from heaters such as the Swiss made Tiba cooker. The importance of having proper flues to take away gases when such fires are "damped down" at night was also mentioned by Mr Couper.

CHIMNEY FUNCTION

The history and use of chimneys were outlined by Mr Barrie Meridew, Marketing Services Manager, Selkirk Metalbestos, who came from the UK for the seminar. He went on to discuss the understanding of the function of chimneys and their contribution to architecture, and said that the fact that a draught is necessary in order to maintain ignition means that a considerable quantity of heat loss in the area to be heated is incurred, and therefore a waste of energy.

DRY FUEL

Mr Meridew also stressed the importance of using dry fuel, thus minimising the production of creosotes which can cause chimney fires. He stated that the less efficient woodburning stoves tend to cause a higher flue temperature with resultant heat loss in the room.

POTENTIAL

Mr Gerry Lyons of An Foras Taluntais described the principle of Short Rotation Forestry which applied to species of forest material which give rapid juvenile growth and are capable of regrowth from harvested stumps through successive cutting cycles. The development of this principle first began in Georgia, USA, in the 1960s for use with pulp and paper industries. Its success resulted in investigation for use as an energy potential. Mr Lyons went on to outline the experiments carried out by the Agricultural Institute in this field, and said that as the cost of imported fuel oil continues to escalate, results have shown that S-RF energy plantation may, in the near future, provide a partial solution to Ireland's energy equation.

The seminar was attended by architects, engineers, and building contractors and the chairman was Mr Hugh Maguire, FCIBS, FIDHE, FRSH, MASHRAE, Consultant Engineer.

H & V News hope to reproduce edited versions of these papers in a future issue.

LITERATURE

Woods Practical Guide to Fan Engineering, Third Edition by B B Daly Published by Woods of Colchester Ltd. Price £8.50 (Sterling)

Written in short, concentrated sections, this third edition of 'Woods Guide' lives up to the reputation of its predecessors in being a most useful compendium on fan engineering. It is intended to be not only a guidebook for the application engineer responsible for the installation and selection of fans, but also a general reference book for the user of fans. With these two requirements in mind, the book provides a large selection of tables and graphs of standard data, performance characteristics, research results and legal requirements; and also attempts to explain the reasoning behind the guides and rules laid down for correct fan use.

The first half of the book is devoted to the reasons for ventilation — comfort conditions, heating and cooling of buildings, and pollution control. This is followed by a description of the physical laws of air flow in ducted systems. The second half leads off with the technical definition of a fan and continues with a run through the different types of fans; their performance; drives and controls; duty control; noise, dirt and fatigue, fan testing; and their uses.

The book is completed by a chapter entitled 'Useful data', containing such varied information as the decibel scale, the normal statistical distribution, climatic data etc.

IDHE Standard Specification in Demand

The new Standard Specification for Heating Installations, recently published by the Institute of Domestic Heating and Environmental Engineers, is in such demand in the UK that already a second printing has been necessary.

The success of this publication, which is sub-titled, Part 1 Piped Heating Systems, smallbore and open vented, is encouraging to the Institute who have now commenced work on two further sections. Part 2 - dealing with Warm Air Systems and Part 3 Electric Heating Systems.

Copies of Part 1 of the Standard Specification may be purchased at a price of £2.00 (£1.25 IDHE members) per single copy inc: P&P. Quanity discounts are available for bulk purchases to Contractors, Consumer organisations and Educational bodies. Orders with remittance should be sent to the IDHE at 93 High Road, Benfleet, Essex. Tel: Benfleet 54266, all prices quoted are in £s sterling. Most of the specification applies to Ireland but before it is used here a number of changes are called for eg. Reference to steel tube is not made and of course no reference is made to IIRS Standards.

Water Wells

Underground water resources are usually ignored by city dwellers who have only to reach out to turn on the tap in order to satisfy their immediate needs. For the most part, the siting of industry is constrained by the presence of urban water services or surface streams and lakes. Although recent acute water shortages in some cities have highlighted the fact that even in Ireland surface water supplies are fallible, it is the rural householders and farmers who are most keenly aware of the vital need for an adequate, reliable supply of clean water. Modern agriculture, as the largest industry in the country, is almost entirely dependent on local water sources and certainly if other industries are to be established in areas of high unemployment, the availability of water will play an essential role in determining their location. The predictable failure of surface sources to provide adequate supplies of pure, unpolluted water may well be a limiting factor in the development of industry and intensive agriculture in the Ireland of the future. An adequate study of groundwater and the compilation of a full inventory of available supplies, together with appropriate conservation measures, will undoubtedly alleviate some of the difficulties in years to come.

The Department of Industry and Commerce has therefore issued an information circular aimed at providing practical, useful details to county planners, farmers and cooperatives, as well as to rural householders with individual watersupply problems. The circular was prepared by the Geological Survey Office, Ground Water Division and the reference number is 79/1.

Further information from The Department of Industry Commerce & Tourism, 14 Hume Street, Dublin 2.

Aspects of Energy Conservation

In October last, An Foras Forbartha presented the results of research on important aspects of energy conservation. The seminar, which was intended as a contribution to the national programme to mark International Energy Conservation Month, was aimed at persons in a position to implement and promote measures to conserve energy. The large attendance and enthusiastic reception have encouraged the Institute to provide a more lasting record and to make the proceedings available to a wide readership. The papers presented here are concerned with technical aspects of energy use and conservation. The more important points contained in the papers are summarised below.

Two papers were presented on energy conservation in buildings. In the first of these Mr Pat Minogue notes that the effect of insulation is to increase house temperature and reduce energy consumption. In considering the potential saving from insulation he notes, however, that for the average non-centrally heated house only 33 per cent of the calculated savings from energy conservation measures are likely to materialise. For the average centrally heated house the figure is somewhat higher at 60 per cent. The remaining potential energy savings are likely to be used to increase house temperature. However, conservation measures are still cost-effective, even if the increase in house temperature is not taken into account. This is particularly so for attic insulation, weather-stripping of doors and windows, cavity fill and the lagging of hot water cylinders.

Rapid results from energy conservation in existing housing would require significant capital expenditure to improve both heating systems and insulation. A programme of up-grading over ten to twenty years should be initiated immediately.

In the second paper on energy conservation in buildings, Mr. Carroll considers the effects of fuel substitution. He notes that the current switch over from oil to solid fuels, while saving oil, tends to increase the total consumption of energy. Investment in solid fuel apparatus is not a substitute for investment in insulation where a reduction in energy consumption and lower heating costs are the long-term aims. To get the best results from solid fuel central heating, a change in heating patterns is required. Intermittent heating should be replaced by continuous heating to a low temperature with individual rooms boosted to higher temperatures when required.

This very useful publication is available from An Foras Forbartha, St Martin House, Waterloo Road, Dublin 4. Good value at £1.50.

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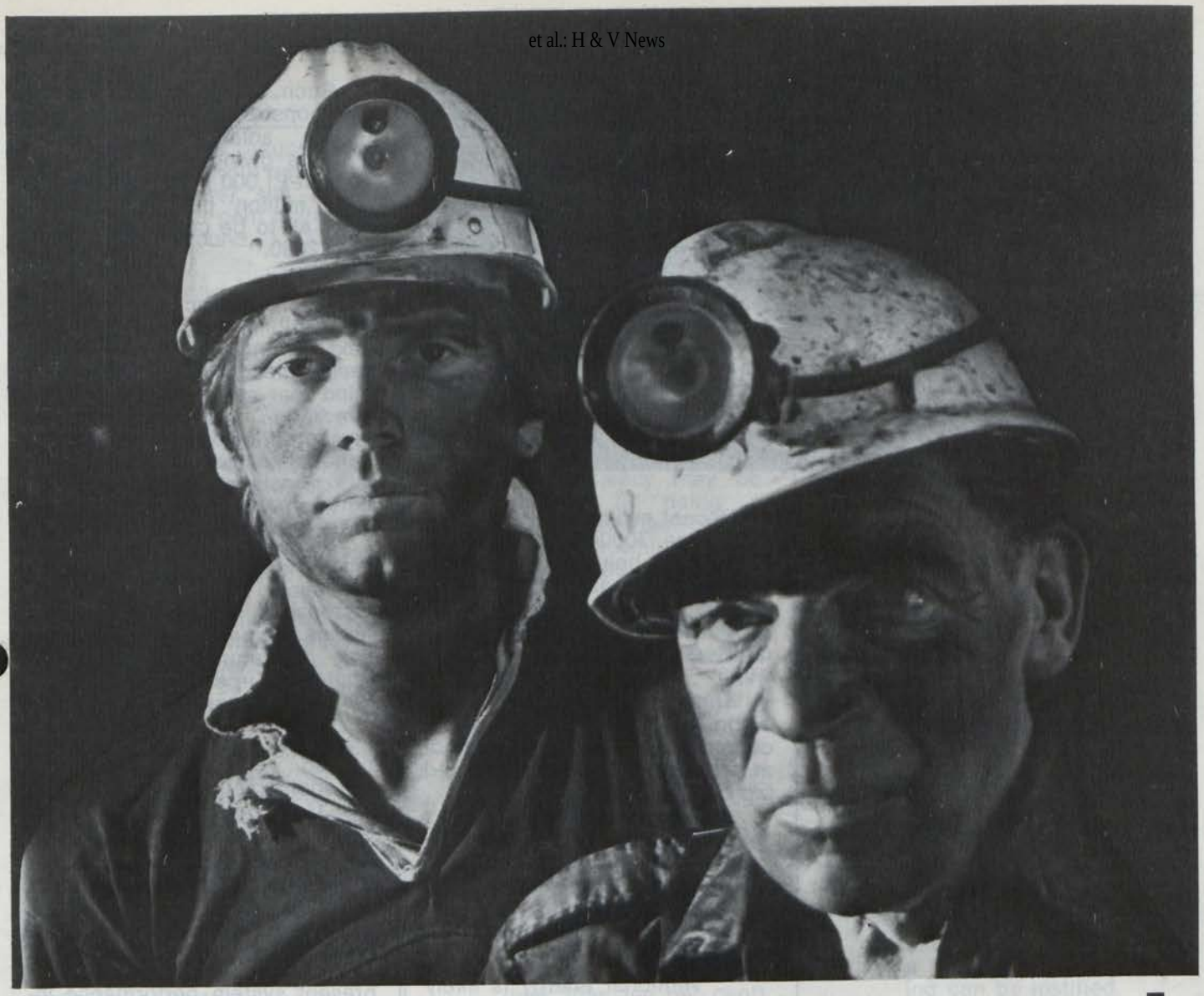

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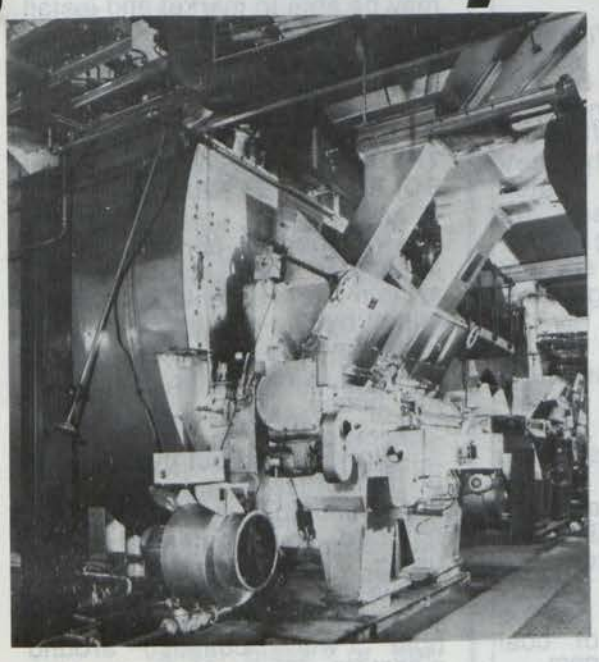

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SOLAR ENERGY FOR DOMESTIC HEATING

by

W. B. GILLETT

BSc, CEng, MIMechE

W.B. GILLETT BSc., CEng, MIMechE attained his BSc in Mechanical Engineering at Bristol in 1972, his apprenticeship with Rolls-Royce Aero Engines leading to work on the development of the turbine in the Olympus engine for Concorde. Joined University College, Cardiff, in 1974 as a research assistant in solar energy studies and has worked since then primarily in thermal conversion of solar energy. He has been a lecturer in Mechanical Engineering and Energy Studies since 1977, is a member of the BSI Technical Committee for Solar Heating and Chairman of the subcommittee investigating reliability and durability test procedures; also UK representative on the collaborative solar collector programme of the European Commission and the International Energy Agency.

Introduction

The solar heating market has grown in the U.K. from a small band of enthusiasts to a viable commercial enterprise during the past six years.

Recent estimates (1) suggest that some 7000m² of solar collector are being installed per annum, which at a typical price of £100 per m² would indicate an annual turnover of around three quarters of a million pounds.

The manufacture, however, is being shared by over seventy companies and therefore cannot at present levels be considered big business.

Two recent government predictions could be expected to provide encouragement for this new industry, and these are

(i) that the real price of conventional energy is likely to double by the year 2000; and

(ii) that three per cent of our energy resources will be derived from renewable sources by the year 2000.

Approximately twenty - five per cent of our final energy consumption is used by the domestic sector (2), and typically twenty to twenty-five per cent of that is used for the heating of domestic hot water. Hence the energy used for domestic water heating represents around five or six per cent of our final energy consumption.

Since a typical solar water heating system is likely to provide about one-third of the hot water demand, and assuming that about half of our houses may be suitable for solar heating, then one might estimate a one per cent potential contribution to the national energy supply from solar water heating (or five million tons of coal equivalent by the year 2000).

Such a plan would require the construction of about ten million solar water heating systems giving an annual turnover at £1,000 per installation of £500 million per year if they were all to be completed by the year 2000.

The construction of 1,370 installations per day for the next twenty years, however, seems most unlikely, bearing in mind that at the present time a hundred manufacturers are having difficulty in maintaining a national average of three to five installations per day between them.

Such developments are outside the scope of this paper but seem likely to include an increase in the use of passive means of space heating and the use of naturally concentrated energy sources such as wave and tidal power.

In the belief that there will remain an active and expanding solar heating industry the Government and research establishments are involved in studying solar heating systems with two primary objectives.

Firstly they are seeking ways to improve the thermal performance of systems and to present system performance information to the man in the street.

Secondly they are working to derive practical guidelines for system design in order that manufacturers and installers may be able to market and install long life and durable systems which will recover their capital costs during their lifetime.

THERMAL PERFORMANCE OF SOLAR WATER HEATERS

The thermal performance of a typical solar water heating system is essentially determiney by the quality of the collector and the ratio of the collector area to the water demand in the house.

Work carried out by members of the British Standards Institution Committee has shown that a good 4m² domestic system using matt black painted single-glazed collectors with ca 1m² per person in the household will collect around 1,200kWh per year in the U.K.

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A system with reduced heat losses (e.g. one with selectively coated absorbers) will collect about fifteen per cent more than this, giving around 1,400kWh/year(3).

The System

From the point of view of thermal performance a good system would require a pre-heat tank with a volume greater than 50 l per m² of collector, and the tank and its pipework should be adequately insulated (say to a standard of 0.4W/m²K.).

If an indirect collector circuit is used then the effectiveness of the heat exchanger in the pre-heat tank should be greater than about 0.6 (4).

For water-based heat transfer fluids this probably means in practice about a 7m. length of 5cm. diameter pipe in the pre-heat cylinder. For oil-based fluids an even longer coil or the use of fins may be desirable.

Most systems in use in the U.K. employ pumped circulation and a typical flow rate for water-based fluids would be 0.015Kg/s per m² of collector.

System performance can be significantly affected by the operation of the system controller. A good controller will usually switch the pump on when the panel is about 2-5°C. hotter than the preheat store and switch it off again when this temperature difference has dropped to about 0.8°C. A time delay in the controller may help to reduce "hunting".

The Collector

The thermal performance of a collector depends essentially on three elements of its design

(a) **The cover plate** should have a good transmission for solar radiation (wavelengths 0.3 to 2.5 μm), and a good absorptance for thermal radiation (wavelengths greater than 2.5 μm). These requirements correspond well with the properties of glass and many transparent plastics used for "vandal glass" or horticultural purposes. The cover should be placed at a spacing of 3-5cm. from the absorber surface to minimise front heat losses.

(b) **The absorber** should be coated with a surface which is "black" .(i.e has an absorptance greater than ninety per cent) for solar radiation. A reduction in heat losses and corresponding increase in collective efficiency may be obtained by using a "selective surface" which has a low emittance for thermal radiation.

If the absorber is not of the "sandwich" type with a fully wetted absorbing plate, then the sizing of tubes and fins is of great importance. A set of curves which allow the absorber plate efficiency (F') to be estimated is given in fig. 1. These curves have been computed assuming a perfect bond for heat transfer between the tube and fin and for laminar fluid flow. A marginal improvement (less than ten per cent) can be achieved in some designs by the use of turbulent flow conditions, but for most good absorbers using aqueous fluids the gain is less than five per cent. Oil-based fluids which have poor convective heat transfer in laminar flow conditions could exhibit variations in the absorber plate efficiency of as much as fifteen or twenty per cent as a result of variations in flow rate, and expert advice from the oil manufacturers should be sought when designing absorbers for these fluids. The absorber plate efficiency for the appropriate tube diameter may be read from fig. 1 when the appropriate value of $k\delta$ for the material and fin thickness has been found from fig. 2.

Experience suggests that mechanical clamping of a tube to a plate or fin will produce very poor heat transfer in the long term and that a brazed or welded fixing can be justified.

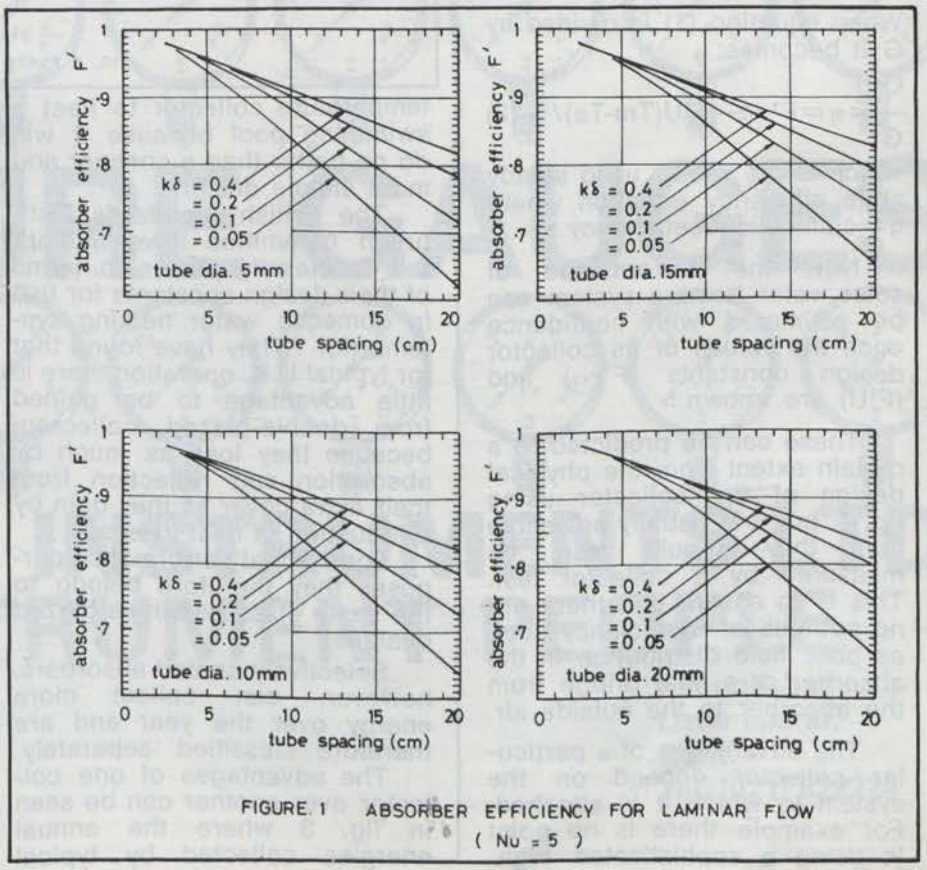

FIGURE 1 ABSORBER EFFICIENCY FOR LAMINAR FLOW (Nu = 5)

ZONE

(c) **The enclosure** (or collector box) provides insulation for the edges and rear of the collector, and should for typical domestic water heating applications have a back loss coefficient of about 0.5W/m²K. (This might correspond to about 6cm. of insulation material).

The performance of a collector can be written in terms of a collector characteristic equation for steady state operation.

$Q = F^1 (G\tau\alpha - U(Tm - Ta)$ - (1)

Where

r = Transmission of cover plate (e.g. 0.84 for glass)

α = Surface absorbtance (e.g. 0.95 for black paint)

U = Overall heat loss coefficient (e.g. 6W/m²K for black paint, 3W/m²K for selective surface)

Tm = Mean water temperature in collector (°C)

Ta = Air temperature (°C.)

F^1 = Absorber plate efficiency (e.g. > 0.9: see fig. 1)

Q = Rate of heat collection (W/m²)

G = Solar radiation intensity (W/m²)

When equation (1) is divided by G it becomes:

$$\frac{Q}{G} = \eta = F^1\tau\alpha - F^1U(Tm-Ta)/G \text{-(2)}$$

which is the widely used steady state efficiency equation where η = collective coefficiency.

Now the performance of solar water heating system can be estimated with confidence once the values of its collector design constants ($F^1\tau\alpha$) and (F^1U) are known.

These can be predicted to a certain extent from the physical design of the collector using fig. 1, but it is usually advisable that they should also be measured by a collector test. This is to ensure that there are no sources of inefficiency such as poor fluid distribution in the absorber or a heat bridge from the absorber to the outside air.

The advantages of a particular collector depend on the system to which it is attached. For example there is no point in using a sophisticated high-temperature collector to heat a swimming pool because it will do no better than a cheaper and more simple design.

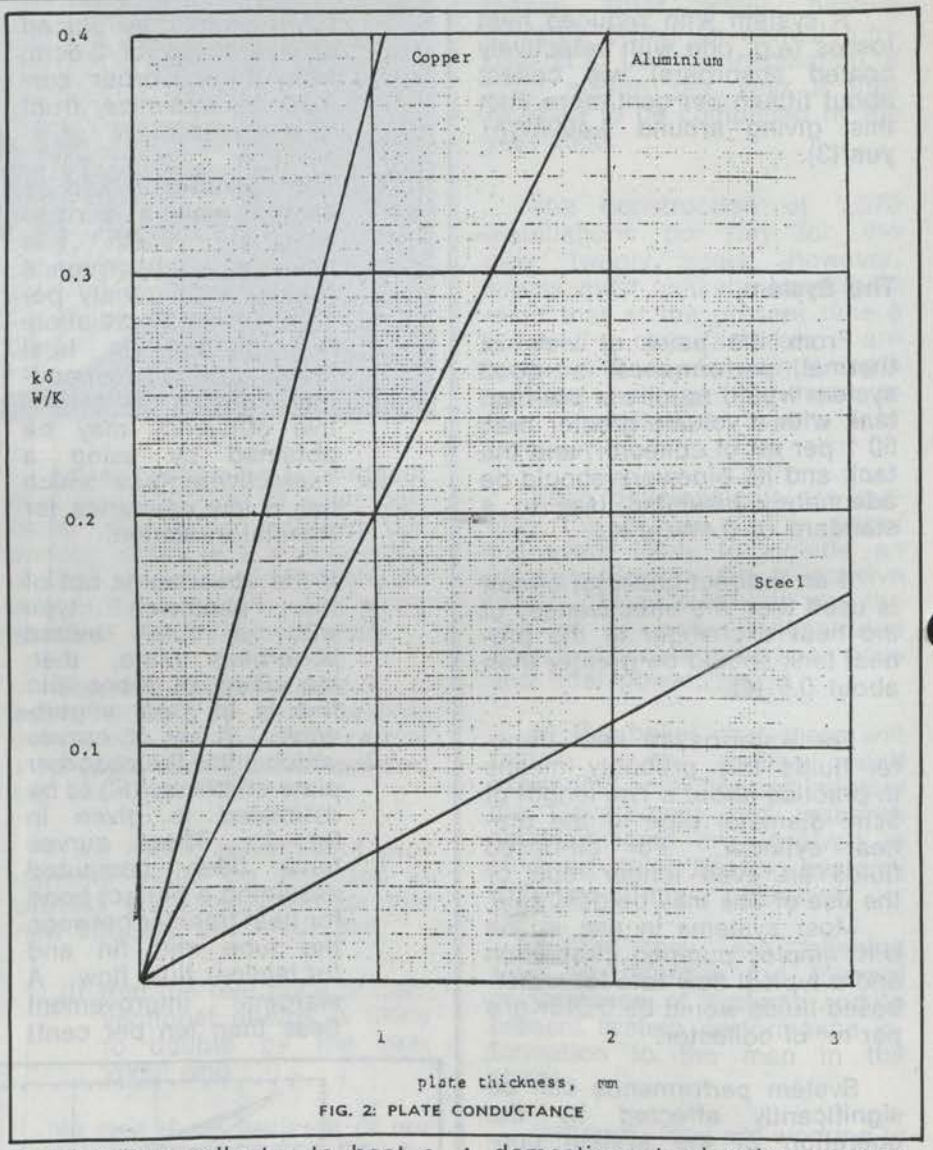

FIG. 2: PLATE CONDUCTANCE

The British Standards Institution committee have attempted to classify panels in terms of their design constants for use in domestic water heating systems (3). They have found that for typical U.K. operation there is little advantage to be gained from double-glazed collectors because they lose as much by absorption and reflection from their extra cover as they gain by a reduction of heat losses.

For thermal performance purposes they therefore belong to the same class as single-glazed designs.

Selectively coated absorbers, however, can collect more energy over the year and are therefore classified separately.

The advantages of one collector over another can be seen in fig. 3 where the annual energies collected by typical domestic water heating systems are compared for collectors with different steady state performance characteristics.

In fig. 3A the selectively coated collector with a low heat loss coefficient operates consistently at higher temperatures than the matt black collector and collects more energy.

In contrast the double glazed collector (fig. 3B) collects approximately the same amount of energy over the year, with slightly less at low temperatures and slightly more at high temperatures than the matt black collector.

DURABILITY AND RELIABILITY CONSIDERATIONS

Many of the components of a solar water heating system are well known to the heating industry and may therefore be selected in the light of experience. However there are components such as the collector and system controller with which there is

ZONE

little experience. It is therefore important that both the designer and installer take all possible steps to avoid the common problems which have already been identified in connection with these components.

The Controller

The collector suffers essentially from weathering, thermal cycling and infrequently from high stagnation temperatures (150°C. for matt black absorbers and 200°C. for selective absorbers). With selective coatings it is important to avoid the use of soft solders and most foam insulation materials in contact with the absorber.

All collectors must breathe and will suffer intermittently from condensation. The collector materials, in particular the insulation, must therefore be capable of withstanding moisture. Drain holes (shielded from driving rain) should be provided.

All the fastenings should be in corrosion compatible materials (e.g. **not** steel screws through aluminium) and designs should allow for unequal expansion of different materials during thermal cycling.

A common system problem is that of an air lock, and hence absorbers should be designed and installed to ensure a free path for air to rise to a bleeding point.

If a panel must be drained to prevent failure during freezing then there is similarly a requirement for the panel to be able to empty freely.

External weathering is obviously important and one of the most informative tests available is simply that of placing an empty collector on a stand and leaving it to weather naturally at the manufacturer's factory. This simple test on a good summer's day will also confirm whether or not the panel can withstand its maximum temperature condition.

The need for compatibitiy of fluids and pipework materials is a subject of considerable concern to the British Standards Institution Committee. There are some excellent corrosion inhibitors and anti-freeze formulations on the market, but advice should always be sought from both the fluid manufacturers and the local water undertaking before a new combination is installed.

The System Controller

The controller is usually activated by a difference in temperature between the panels and the preheat store and it is required to switch the circulating pump on and off.

One of the most common causes of failure is that of poor thermal bonding between the temperature sensors and their system components. An integral detector mounting or bolt-on fixing system would appear to be justified here.

The range of ambient temperatures in a loft which is well insulated from the dwelling-house has surprised some designers. Temperatures from —5°C. to +45°C. are not uncommon, and if the controller is sited in the loft then its circuit must be drift-free over this range.

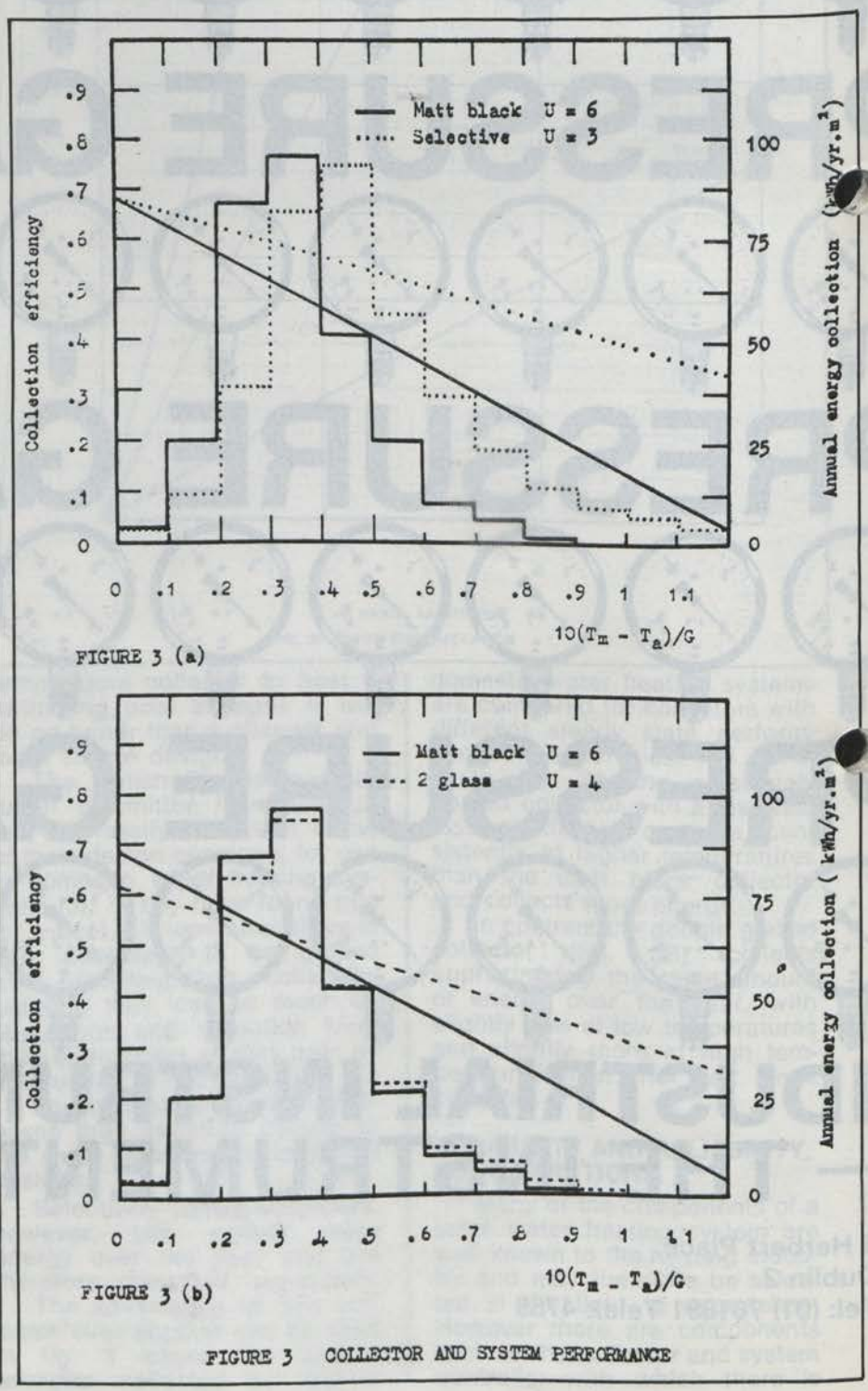

FIGURE 3 COLLECTOR AND SYSTEM PERFORMANCE

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ZONE

The use of high panel flow rates and very small temperature rises can make control particularly difficult. Common practice would suggest that a suitable value at which to switch off the pump is around 0.8°C. Even here the signals can be very small and extraneous electrical noise or contact potentials can cause serious installation difficulties.

The panel sensors must, of course, be capable of withstanding the maximum stagnation temperatures (200°C. for selective surface) and this precludes the use of some types of transducer.

Attempts to cut the costs of a controller by using cheap components and simple circuitry usually result in a short life and a tendency for control function drift. A few simple durability tests over a range of temperatures might save future embarrassment even if they do result in a slightly higher controller cost.

SOLAR ENERGY AND THE HEAT PUMP

For many years conventional heat pumps have been large and costly devices which benefited their owners through their ability to utilise "free" energy from the outside air.

More recently, however, smaller and more efficient devices have been under development for European use, and it is to be hoped the cost of these may drop significantly.

While the cost of solar energy remains very similar to that of peak rate electricity, however, it seems most unlikely that a symbiotic alliance between solar collectors and heat pumps can prove economically attractive. Indeed, at the present time the use of gas heating, where it is available, is cheaper than a heat pump even when free low-temperature heat can be utilised.

As is well known, the heat pump takes in low-temperature heat energy (at, say, T1) and adds work from a high grade source such as electricity to produce heat at some desired temperature (say T2).

The heat output at T2 is usually expressed in terms of a multiple of the high grade energy supplied, by a coefficient of performance (CoP).

$$\text{where CoP} = \frac{\text{Rate of heat output at T2}}{\text{Conventional power input (electrical rating)}}$$

Now the CoP for commercial devices typically lies somewhere between 1 and 4. If a value of 3 were taken, for example, for an electrical heat pump, then of the heat output one-third would have come from the electricity and two-thirds from the low-temperature heat source.

If the low-temperature energy is free (e.g. fresh air) then the capital cost of the heat pump can be balanced by its saving in fossil fuels.

However, if the low-temperature source is solar energy then this, too, will have a cost which may be calculated by amortisation of the collection system.

The advantage of the heat pump of the solar collector is that its CoP can be increased by raising the value of T1 above that of the ambient air; but analyses have shown that for this to give an overall economic advantage the solar collection system must be very cheap indeed.

The total solar system costs, including the installation of a large heat store, would probably need to be less than about £50 per m² of installed collector (5).

The combination of a solar collector and a heat pump should not necessarily be compared with either a solar collector or a heat pump on its own.

Comparisons should rather be made with cheaper and more simple systems such as a heat pump with a large heat store to smooth out the demand peaks or a heat pump with bottled gas as the back-up source.

DISCUSSIONS AND CONCLUSIONS

There would appear to be a sound future for the solar heating industry and in particular a growing market for domestic water heating well into the next century.

The design of solar collectors and systems is now quite well understood in principle and can be reduced to a relatively small number of simple requirements.

Common sources of failure appear to be concentrated in the collector and the system controller and these therefore require special attention. The major emphasis for new work should be on the development of cheaper and more durable system designs.

The combination of heat pump and a solar collector does not appear to show great promise in the short term.

In principle there seems no reason why heat pumps could not be developed to the point where they can be made as cheaply as the common refrigerator.

When domestic heat loads have been reduced by insulation and controlled by ventilation then at some time in the future one can imagine more sophisticated domestic heating systems in which solar collection, heat recovery and heat pumps will have a role to play.

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NEW PRODUCTS

Girdlestone Floatswitch from Walker Air

The latest version of the Girdlestone type M Floatswitch which includes polypropylene covered weights in preference to lead, steel or cast iron is now available from the Fluids Handling Division of Walker Air Conditioning Ltd., Dublin. The switch and standard floatgear is entirely constructed from plastic with the exception of the heavy duty mercury tube and spring.

ABS thermoplastics and Acetal are the materials used for the switchbix — ABS to give strength and Acetal for the operating arm, spindle and mercury tube carrier because of its self lubricating and electrical characteristics. Both have good chemical resistance so that corrosion is minimised when installed under arduous conditions such as those found in chemical works and in salt laden coastal atmospheres. The use of these materials also ensures that the switch cannot become electrically alive.

Standard floatgear comprises ABS float, terylene cable and polythene stops and for hot water, corrosive liquids and chemical solutions the floatgear is of stainless steel. Rod operated switches are also supplied. Installation is extremely simple and the switch can be arranged to either "break on rise" or "make on rise".

Girdlestone Pumps Limited has been manufacturing floatswitches for over half a century and many thousands have been exported all round the world for the automatic remote control of electricity driven pumps of all types. Not only for pumps, but also for use with high and low level alarms, limit switches motorised valves and other equipment requiring to be controlled by change in liquid level.

For further information contact Walker Air Conditioning Company Limited, Dublin Industrial Estate, Finglas Road, Dublin 11, (Tel: 300844).

The latest version of the Girdlestone type M floatswitch now available from Walker Air Conditioning Limited, Dublin.

'Twin' Fan Units from Finheat

Finheat Ltd are now marketing a completely new range of "twin" toilet extract fan units from Fenton Mechanaire Ltd, suitable for internal and external applications.

Two basic types of unit are available, each in weatherproof roof mounting or indoor mounting form.

'Rotwin' direct drive light duty — single phase electrics. 240V, 50 Hz.

Both designs make use of quiet running double inlet multivane impeller centrifugal fans which will provide high flow rates against duct resistances without undue noise.

All units are designed to provide continuous extract ventilation employing the use of twin separate centrifugal fans, each rated for the selected duty so that either can act as a complete standby.

Units are available with various optional inlet positions and in some cases different sizes.

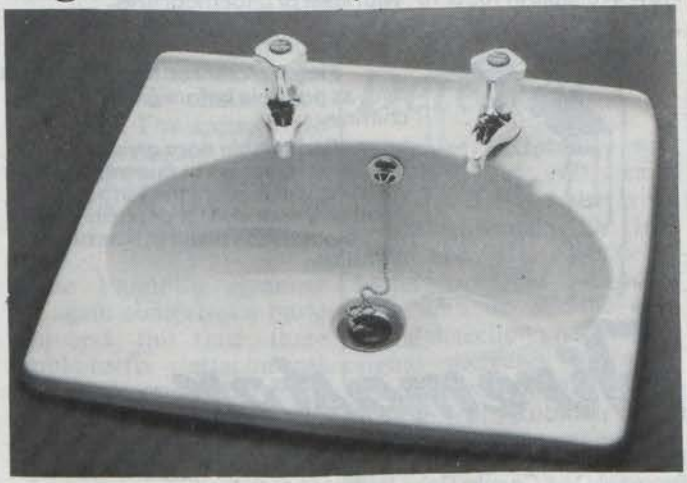
'Europa' Valve

A unique and versatile product — that is an apt description of the 'Europa' Spring Loaded Valve which can be used either as a non-return or Foot Valve. Manufactured by Itap the body is in brass, the spring in stainless steel, the disc in nylon and the seat in rubber. For use on a wide variety of fluids e.g. hot water, oil and gases, it can be installed in horizontal, vertical or sloping pipelines, and is available in sizes ⅜" to 4". The spring action gives a degree of tightness and reliability which is not attainable by the conventional non-return Valves and for this reason the 'Europa' Foot Valve which is no more expensive has come to be accepted over the past few years as a first-class product on pumping installations. As a non-return Valve it is rapidly gaining acceptance also so that the 'Europa' fully compliments the Itap range of Valves already being sold here e.g. Ball Valves and Gatevalves. Further details from stockists or from Itap Agents:— S.W. Carty & Son Ltd. 48A Robinhood Industrial Estate, Clondalkin, Co. Dublin. (Tel: 508046; Telex: 31055).

Space-Saving Pallas Vanity Basin

Following its successful debut at Interbuild, Doulton Sanitaryware is now launching the new Pallas acrylic vanity basin with moulded soap dish, waste and overflow. Only 500mm in width, the self-rimming Pallas is ideal for compact spaces such as cloakrooms or dressing rooms, but has a generous bowl area for its size. The neatly designed Pallas has a simple method of fastening and is available in the full range of Royal Doulton acrylic colours.

Doulton Sanitaryware is available from leading merchants throughout the country.



Pictured above, the new Pallas acrylic vanity basin from Royal Doulton Sanitaryware.

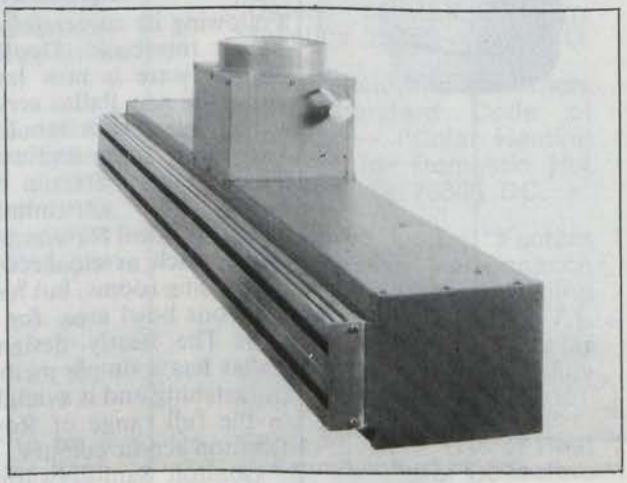
NEW PRODUCTS

TROX VARYSET BYPASS SYSTEM FROM REDBRO

With the need for energy saving in air conditioning systems, the VAV has gained almost universal adoption by designers in recent years — especially as it operates at lower cost than other conventional systems. Prior to the introduction of VAV systems, diffusers were basically fixed area devices discharging at constant velocity. But with variable volume the need arises for a different approach — particularly when turn down ratios of 3 to 1 are common place. The problem then, stated simply, is to design a system such that the air distribution devices perform adequately over an air volume range varying from 100% down to say 40%. The 'throw' of an air terminal device is related to the momentum of the air, which in turn is proportional to the velocity squared. Hence, even a 50% down turn represents a velocity of throw equivalent to approximately a quarter of the design conditions. Trox research has recently developed a simple, maintenance-free system operated plenum device known as Varyset, to overcome this problem. The entry into the plenum is divided into two chambers, in the large chamber a flap, which is system operated, is free to rotate and opens and closes with the variation in supply air-volume discharged by the VAV control unit. By means of a counterweight on the flap shaft and suitable resistance screens, the partial flow through the smaller area remains the same whilst the flow to the outer sections is reduced. At low air flows this maintains the air velocity over a reduced area of the diffuser and provides an improved air distribution within the occupied space.

The Trox Varyset is ideally suited to slot or square diffusers and obviates stagnant areas, dumping, cold floor effect and other problems inherent to VAV systems with large turn down ratios.

Further information available from Redbro Ltd., Landscape House, Landscape Road, Dublin 14, Tel: 667968.



The Trox Varyset Plenum.

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NEW PRODUCTS

CN Glass Tube Heat Recovery Unit

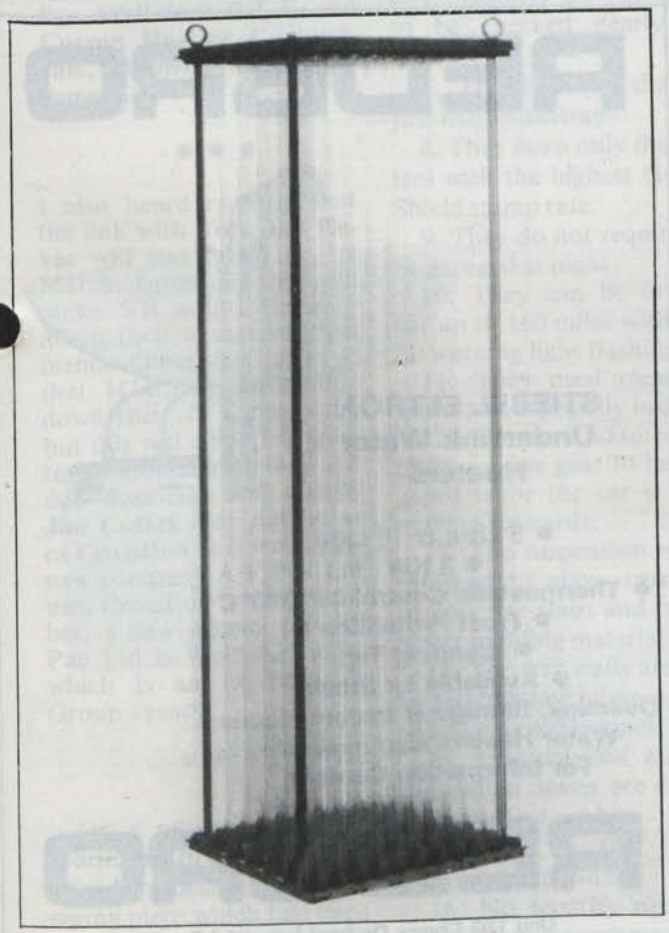
Curwen & Newbery Limited, manufacturers of the CN Heat Regenerator, Heat Pipe and Plate Type Heat Recovery Equipment have widened their range with the introduction of a Modular Glass Tube Heat Exchanger purposely designed to recover heat from air/gas streams which would normally corrode metal heat exchangers.

The Glass Heat Exchanger Tubes are resistant to most types of chemical attack, resists abrasion and with its natural polished finish only needs simple washing to restore its original condition. The transparency of glass allows visal checking of dirt formation.

Other advantages are its low resistence to thermal shock and the very low coefficient of expansion of glass resists thermal shock of around 180°C. There is also a cost advantage for the same amount of heating surface area, glass is approximately 33% less costly than aluminium, and approximately 80% less costly than stainless steel.

The modular design of the equipment allows many combinations and air volumes may be handled between 1.4m^3/s to 56m^3/s (3,000 c.f.m. to 120,000 c.f.m.). Heat transfer efficiencies vary between 50/80%. With sealed air streams the equipment is particularly suitable for the chemical and food manufacturing industries.

Further information from MCW Ltd., 10 Wynnfield Road, Dublin 6 (Tel: 976-729).



The CN Glass tube heat recovery unit from MCW Ltd.

Salamander Introduce New Heating/Plumbing Spanners

(L-R) Salamander Plumbing Spanner Kit for Taps & Wastes, Baths & Basins. Salamander Heating Spanner Kit for Radiator Valve Tails, Plugs & Vents. The products are supplied pre-packaged for display.

Two new spanners specially designed for the heating and plumbing market have appeared on the UK market, introduced by Salamander (Eng) Ltd.

The Heating Spanner Kit is a basic tool with only two attachments, yet it fits the majority, if not all, domestic radiator valve tails, plugs, and vents which normally require metric or imperial, hexagon or slotted internal fixing tools.

The spanner itself comprises a socket and handle which is pivoted to allow movement through 180 degrees, giving the maximum convenience and leverage in the fixing or removal of valve tails. The appropriate interchangeable attachments are simply slotted into the socket to match the various fixing requirements.

The Plumbing Spanner Kit again comprises a basic tool and, this time, three simple-to-fix attachments which accommodate the majority of fixing and locking nuts on baths, basins, taps and wastes.

The Plumbing Spanner Kit socket and handle are similarily designed, except that the handle is much longer and incorporates a locking sleeve in order to give the fitter maximum leverage, even in the most awkward situations.

Further information is available from Salamander (Engineering) Ltd., Reddicap Trading Estate, Sutton Coldfield, West Midlands. B75 7BU. Tel: (021) 378-0952.

Robinair Leak Detector

Robinair have recently announced a new refrigerant leak detector on the Irish market through RSL (Ireland) Ltd. The detector is battery operated and portable with an audible and visual detection system. The signal increases in pitch when pinpointing the leak.

Also from Robinair are a new digital temperature tester, an analog temperature tester and lectra-torch which is a flameless silver soldering device.

NEW PRODUCTS

'Saturn' Heat Saving System

The system is a simple and economical method of returning down to working level the heated air that normally rises and then gathers or is lost through the roof/ceiling. This reduces the number of times the thermostat switches on and considerably reduces fuel consumption.

The "Saturn" system consists of:

(a) Weatherite Ceiling fans which have specially designed blades with unswept ends for wider distribution of air. The fan motor is reversible which means that the air flow can be upwards or downwards.

(b) An Automatic Environment Regulator complete with high or low heat sensors, and designed to control up to five fans of similar size. This regulator is the only one of this type available at present and when set to automatic will signal the fans to return down the hot air when temperature at high level exceeds temperature at low level. The fans cease to operate when parity is reached. The regulator is linked by a low voltage cable to the heat sensors and they can be set for a temperature differential of 5/20° F.

Obviously, fabrication and usage of a building will have to be taken into account, but normally the system will save 15%-30% of heating costs, and of course, it can also be used in Summer to create air movement for a more comfortable working environment. Installation wiring is similar to electric light and consumption costs per fan are only equivalent to a hundred watt bulb.

Further information from : Dan Chambers Ltd, 3 Echlin Street, Dublin 8 (Tel: 720448).

Vaillant Multipoint

Vaillant's MAG 400W multipoint has a throughput of 96,000 Btu/hr (27.9kW). The gas rate is varied according to water flow, thus giving a constant temperature to the hot water irrespective of draw off.

The MAG 400W is a compact wall-hung appliance designed for fully automatic operation. Controls consist of a temperature selector knob, and gas control knob which provides on-off control together with automatic pilot light-up by means of piezo-electric ignition. The pilot burner incorporates a thermo-electric ignition safeguard.

The atmospheric gas burner is made from heat — and corrosion-resistant stainless steel. The main burner is operated by opening the hot water tap. When the water flow stops, the gas supply is automatically cut off.

The casing is an easy-clean enamel white finish. Overall dimensions are 422mm (16.6in) wide, 925mm (36.4in) high, and 227mm (8.9in) deep. Models are available for operation on l.p. gases.

Further details from Instaheat Ltd, Office Suite No. 1, Donaghmede Shopping Centre, Raheny, Dublin 13, (Tel: 315028).

PIPELINE

By T. Piece

On a recent phone-in session to "Gay Byrne Hour", a regular R.T.E. feature programme, an enterprising housewife — obviously a regular listener — got the answer to her problem in record time. The lady in question owns a Crane solid fuel boiler (now discontinued), and professed extreme difficulties in obtaining a spare part to keep the home fires burning. Within 15 minutes her problem was solved over the air. The programme researchers tracked down the elusive part to Curzon Heating Components Limited, Belfast, a subsidiary of International Janitor Service Limited who own the Crane marque for heating spares, and established its immediate availability. Curzon handle spares for almost all gas, oil and solid fuel equipment, and were delighted to oblige. Well done R.T.E. and Curzon Heating Components, another satisfied consumer.

• • •

I also heard recently that the link with **York** and **Hevac** will end from the 1st March. I presume that will make S.R a little happier about their agencies agreements. Other A/C news is that HTI may be scaling down their A/C operation but this will allow for greater development of their fridge business, and finally **Jim Coffey** may not be as ex **Crossflow** as it seems, his new company **A F Pac Ltd** uses Crossflow's telex number, a new agency for AF Pac Ltd is Wolf AH units which is an ex Brennan Group agency.

• • •

On a recent trip to the North one of our journalist friends produced the following piece which had been pinned up in his office for the benefit of all who have company cars. Looking at it I'm sure much of it applies to Company cars down south as well.

Company cars — they're so much better

As every fleet manager knows, company cars are quite different from those run privately. In fact they have a number of features rarely found in private cars. Here's a light-hearted summary of the company v private car differences.

1. They travel faster in all gears, especially reverse.
2. They accelerate at a phenomenal rate.
3. They enjoy a much shorter braking distance.
4. They have a much tighter turning circle.
5. They can take 'ramps' at twice the speed of private cars.
6. Battery, water, oil and tyre pressures do not need to be checked nearly so often.
7. The floor is shaped just like an ashtray.
8. They burn only the petrol with the highest Green Shield stamp rate.
9. They do not require to be garaged at night.
10. They can be driven for up to 160 miles with the oil warning light flashing.
11. They need cleaning less often, especially inside.
12. They are adapted to allow reverse gear to be engaged while the car is still moving forwards.
13. The suspension is reinforced to allow carriage of concrete slabs and other heavy building materials.
14. The tyre walls are designed to allow bumping into and over kerbstones.
15. Unusual and alarming engine noises are easily eliminated by the adjustment of the fitted radio volume control.
16. No security needed, can be left anywhere, unlocked with the keys in the ignition.

PEOPLE

(Left): Joe Brennan, Sales Director and (right) Paul McDonald, Financial Director, of Brennan Controls Ltd.

Brennan Controls Ltd. have recently made an all out onslaught on the controls market in this country. In an effort to consolidate their position in the market place a number of changes were made within this particular company in the group. Two new Directors

Joe Bassett, Managing Director, Brennan Controls Ltd.

and Shareholders have been appointed. They are Mr. Joe Bassett as Managing Director and Mr. John Coffey as Technical Director. Paul McDonald still retains his position as Financial Director and Joe Brennan is now Sales Director. These new appointments can only be of great benefit to the trade generally as the team is now one of the strongest forces and most experienced in the business. Brennan Controls Ltd. are sole distributors for the well known range of equipment as manufactured by T.A. Controls Ltd. of Sweden.

John Coffey, Technical Director, Brennan Controls Ltd.

Mercury Engineering Company Ltd., recently announced the following appointments:— **Peter McManamon** BBS, ACPA, has been appointed financial director. He joined the company two years ago as financial controller and was previously financial controller of Lister Tubes Ltd.

John D Littlefield has been appointed director. He has been with the company since 1974 and was previously manager of the sprinkler division.

Jim Smith has been appointed director. He joined the company in 1975 and prior to joining the Board was contracts manager and manager of the mechanical division.

Michael Egan has been appointed engineering manager of Jacobs International, the Dublin based international division of the Jacobs Engineering Group of California.

Companies Supplying Refrigeration Equipment — Industrial and Commercial

Revised from August 1979

Co. Name:	Address:	Tel.	Telex	Brand:
Airacs Ltd	20 Upper Jane Place, Dublin 1	747146		Lightfoot
Anglo Irish Refrigeration Ltd	Balinstown Industrial Estate, Ballyboughal, Co Dublin	433312 433403	31382	Costan, Verco Hill, Caddie Bonnetneuhaus Swedish Royal
Arctic Refrigeration Ltd	167 Upper Rathmines Road, Dublin 6	971277		Frigopol
Brennan Group of Companies	Unit 60 Cookstown Industrial Estate, Tallaght, Co Dublin	514008 514711	33339	McQuay, Friedrich
Burke & Son Ltd	7 The Parade, Donaghadee, Co Down	882202		Howden
Carter-Halligan	Parnell Street, Cloughmacsimon Bandon, Co Cork	(023) 41972		Carter Cooling Towers
C&F Ltd	Glenside Industrial Estate, Mill Lane, Palmerstown, Dublin 20	364917	—	Lennox
Commercial Refrigeration Ltd	13 Bridge Street, Waterford	75441	8560	Arneg, Pegesus Castle Mac Franger Frigor Mario Dorin
Coolair Ltd	Unit C, Cookstown Industrial Estate, Tallaght, Co Dublin	511244	31689	Daikin
Cool Heat Ltd	11 Derryvolgie, Belfast BT96FL	(084) 661837		Hall Thermotank Products
Cool Products Ltd	Balmoral Road, Balmoral Industrial Estate, Belfast BT12 6QD	(084) 664935	747559	RSL, Fridgadare, Poladaire
Cross Refrigeration Ltd	Unit 25 Cookstown Industrial Estate, Tallaght, Co Dublin. Also at Mallow Road, Cork	511915 (021) 502321	31689 6152	Boc, Icelander, Husquavarna, Foster Craig Nicol Revco, Coolbrook, Coolstream GRENCO
Crossflow Airconditioning Ltd	The Colour Shop, Stillorgan Road, Blackrock, Co Dublin	881607	4121	Tate, Edpac Wright
Etscheid Ltd	Portlaoise	(0502) 21759	—	Etscheid
Electrical Refrigeration Co	Harcourt Lodge, Stephens Road, Dublin 8	752694	30446	Prince O'Burren Hemmings

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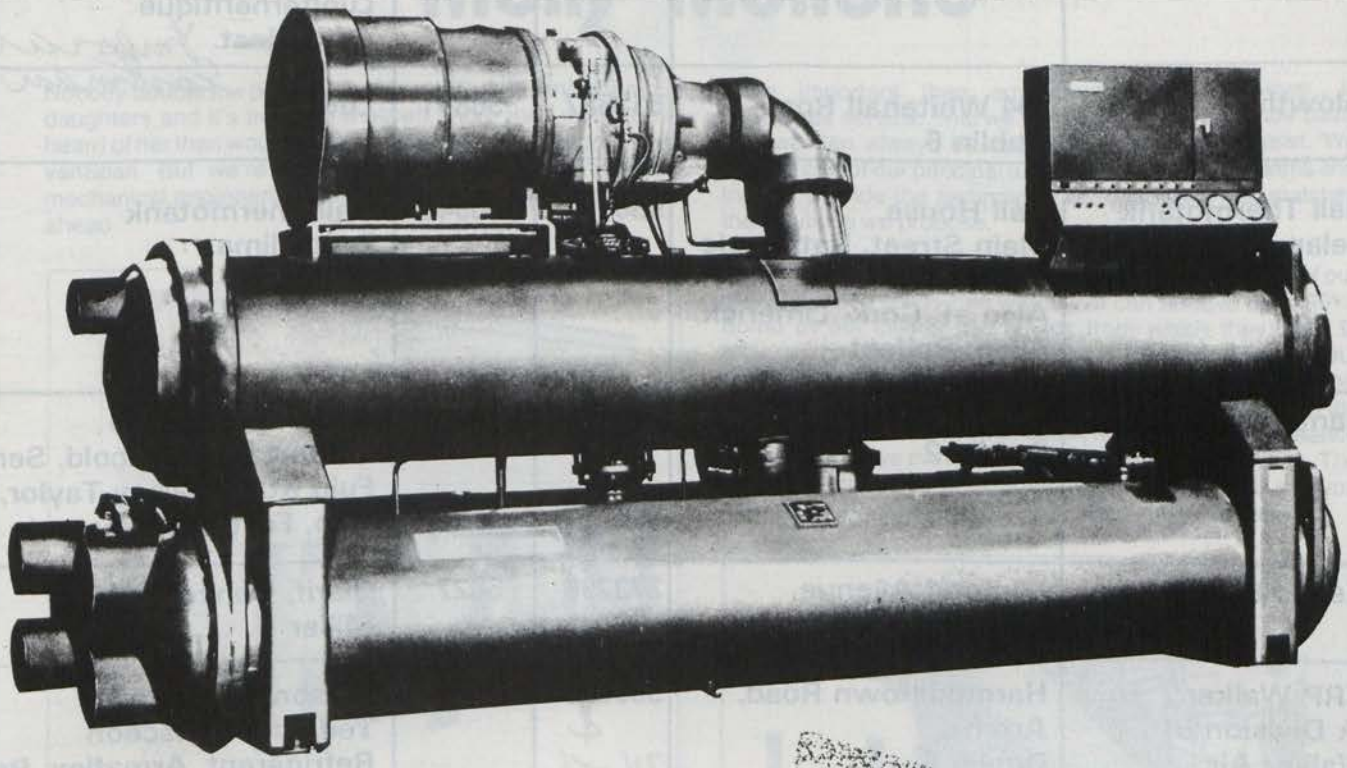
BE ENERGY WISE—
USE WESTINGHOUSE
HEAT RECOVERY EQUIPMENT.



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Unit 4A Coolock Industrial Estate, Dublin 5

Telephone: (01) 470611 – 470209 – 470113 Telex: 31356

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J Norman Fulton	Balmoral Road, Balmoral Industrial Estate, Belfast	(084) 662111	747559	Trane
Brian A Flynn Ltd	Newcastle West, Limerick	(061) 463241	6956	Gram Delta RA
Fridge Spares Wholesale Ltd	37d Dublin Industrial Estate, Dublin 11	303466	30987	~~Refrigeration Appliance~~, Flica, Sporlan Nibco, Rabtherm Luniterheritique ~~Annie Inst.~~ Imperial Eastman
Glowtherm Ltd	194 Whitehall Road, Dublin 6	513887	30841	Luwa
Hall Thermotank Ireland Ltd	Hall House, Main Street, Rathcoole Co Dublin Also at: Cork, Limerick, Sligo, Belfast	580311	30943	Hall Thermotank Deltaclima
Hammond Ltd	111 Pearse Street, Dublin 2	775861	—	Sadio Airo Freeze Scotsman, Prestcold, Serle, Fuju Koki, Halsey Taylor, Upo, Foster & Westgate
Hevac Ltd	Lomond Avenue, Dublin 3	373796	5827	Clarif, Denco Miller
HRP Walker (A Division of Walker Air Conditioning Ltd.)	Harmonstown Road, Artane, Dublin 5.	336056 4 316056	—	Myson, Copeland, Teddington, Isceon Refrigerant, Armaflex, Ranco, LEC, Yorkshire copper tubes and fittings. DMP Aspera
HRP Walker (A Division of Walker Air Conditioning (UK) Ltd.)	9a Cherryhill Road, Dundonald, Belfast BT15 0JH.	Dun-donald 5234	747681	Aspera, Myson, Copeland, Teddington, Isceon Refrigerant, Armaflex, Ranco, LEC, Yorkshire Copper tu and fittings, DMP
ICI (Ireland) Ltd	5/9 South Frederick Street, Dublin 2	765801		Arcton
Keal Ltd	Underhill, Dunmanway, Co Cork	(023) 45238		Keal
Leinster Refrigeration Co Ltd	19 Rutland Place, Dublin 1	742262		Leinster
M K Refrigeration (Ireland) Ltd	Unit 93a Dublin Industrial Estate, Dublin 11	301320		M K Refrigeration
P & D Macfarlane Ltd	51/53 Ridgeway Street, Belfast BT43 JJ	(084) 667968	74219	Carter, Westinghouse, Transfrig, Altair
Manotherm Ltd	4 Walkinstown Road, Dublin 12	783387		Penn

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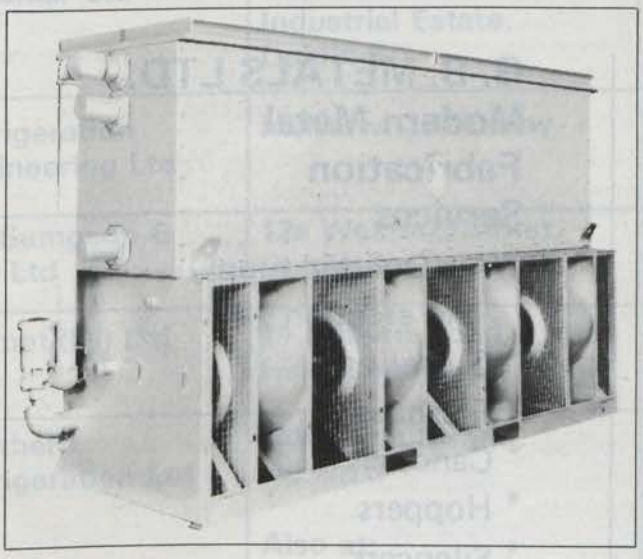
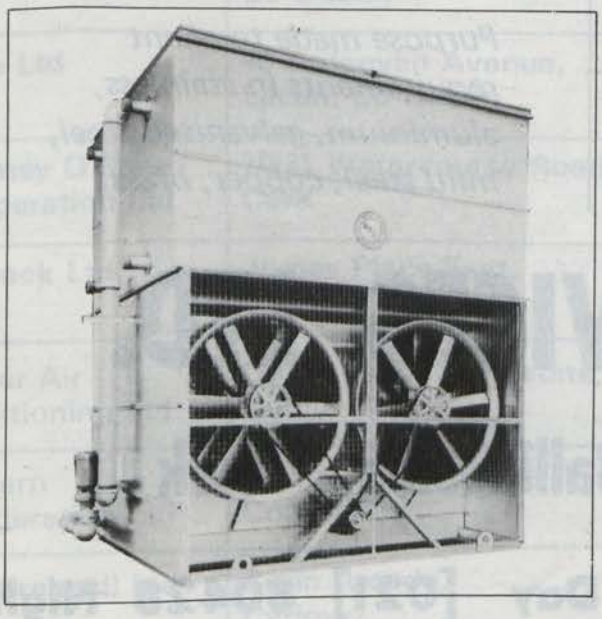
We've more going for us than Molly Mollone

Nobody doubts the popularity of one of Dublin's most famous daughters and it's true that if asked, more Irish would have heard of her than would have heard of Baltimore Aircoil/Heath vanSpall. But we're catching up. In fact in the area of mechanical engineering services, we might even be slightly ahead.

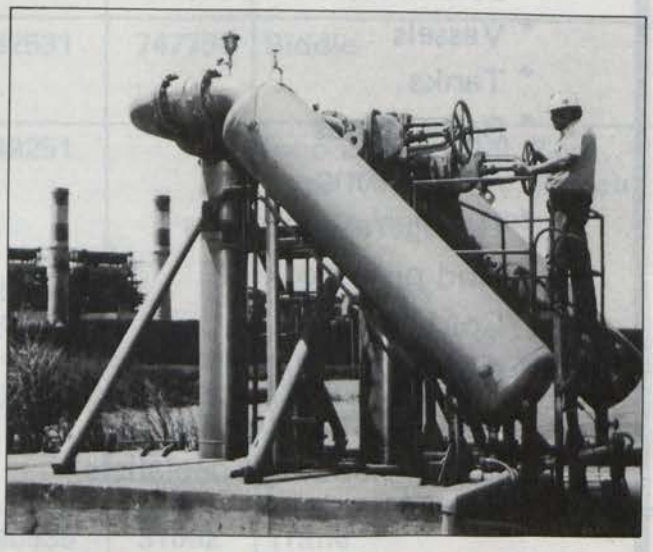


Our B.A.C. range of equipment is the product of an R & D facility whose size alone puts many of our competitors' total manufacturing capacity fully in the shade and when it comes to price we are more than competitive. Our range of over 100 evaporative condensers, for example, sells at prices that even our imitators can't get down to.



More important than equipment supply, however, is after-sales service. This we offer on a truly world-wide basis and we can always be called on to advise or assist. We believe one of our principal functions is to solve problems and then to provide the technology and hardware that matches the solutions we propose.

Here's just one example — the Lakos separator. Some of our clients wanted solids-free water. We can remove up to 99%. Some of our clients use liquids from which they want to reclaim something. We can manage that too. Some of our clients want the best of both worlds — solids-free liquids *and* reclamation. They get it — and at no extra cost (the luck of the Irish). They have no worries about reliability or maintenance because what we provide has nothing that can go wrong. The customer provides the engineering; so if that's you and you can come up with a feed of 5 p.s.i. then you're in business.



Solids removal from the water used in all types of plant and equipment is already proving itself in many of our leading industries. Our Lakos separators are currently protecting the nozzles and control valves of sprinkler systems; cartridge, sub-micron, chemical and sediment process filters; pump water seals and bearings; surface or submersible pump and turbine bowls; condenser tubes and heat exchangers; water treatment plant and softeners — and all with one signal result: maintenance costs that are down — but down.

So if it's a comprehensive service in any area of mechanical engineering services that *you* need, then call us — with confidence. If it's cockles and mussels you're after, perhaps Molly's in the book.

Heath vanSpall Associates Limited

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Telephone WEST DRAYTON 40546/7/8 Telex 934384

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Masser Irish Food Machines Ltd	Kylemore Road, Dublin 10	504499		Sadia, Westgate
Mycold Ltd	Davitt Road, Dublin 12	508310	30272	Mycom, Goedhart, Herl
Nicold Ltd	Beersbridge Road, Belfast BT5	(084) 50275	747977	Prestcold, Kulleg, Keeprite, Norpe
O'Gorman (Ireland) Ltd	Unit 13, Dublin Industrial Estate, Dublin 11	300193	30981	Cole, Dergy Norcool, Keep-rite
R.S.L. (Ireland) Ltd	48F Robinhood Industrial Estate, Clondalkin, Co Dublin	508011	4818	Kuba, Castelcontardo, Arcton, Ranco, Bitzer, Alco, Robinair, Castel, Italest, Yellow Jacket
Reconair Ltd	Unit 4a Coolock Industrial Estate, Dublin 5	470611	31356	Westinghouse
Refrigeration Engineering Ltd	Irishtown, Kilkenny	(065) 21310		Esta-Van Swaay Vest frost
J J Sampson & Son Ltd	12a Wexford Street, Dublin 2	752317		Danfoss
Sermet (NI) Ltd	11 Lisburn Road, Hillsborough, Co Down	682531	747796	Biddle
Southern Refrigeration Ltd	149 North Strand, Dublin 3 Also at: 44 The Quay, Waterford	749251 (051) 75833		Inco Zeigra, Stal, York, Acro Kool, Torry, Revco, Satam Hussmann Bruno Panetta. THERMOLOGIC LTD Celbridge Co Kildare
Total Refrigeration Ltd	Robinhood Industrial Estate, Clondalkin, Co Dublin	507377	—	Total
Trane Ltd	46 Ardeevan Avenue, Lucan, Co Dublin	280935	31082	Trane
Twomey O'Shea Refrigeration Ltd	70/71 Watercourse Road, Cork	(021) 506608	—	Arneg, Verco
Unimack Ltd	James Place East, Dublin 2	789570	4147	Biddle
Walker Air Conditioning Ltd	Dublin Industrial Estate, Dublin 11	300844	4862	Carlyle
Western Refrigeration Ltd	Tuam, Co Galway	(093) 24234	8303	Geneglace, Matal
Zero (Ireland) Ltd	Burin Arcade, Carlow	(0503) 31053	—	Zero

Index compiled from information received from companies and additional information from Suppliers would be welcome for the next issue of the Index on Refrigeration. Companies who supply refrigeration equipment and are not on this list are especially welcome to contact us.

New Concept Water Chillers

It is beyond doubt that, during the last few years, water chillers for air conditioning applications have undergone a great evolution with improved performances and reliability. This evolution is due not only to the normal and continuous engineering development, but mainly to the efforts to obtain high performance characterized by the lowest energy consumption.

In effect, in an air conditioning installation the most electrical power is consumed by the water chiller, which represents approximately 40 to 70% of total consumption, depending on the kind of installation.

The water chiller evolution still in progress is therefore unquestionably justified and, even more, is necessary at this particular time.

The water chillers with open-type compressors and single and double refrigerant circuits have been used essentially for industrial cooling applications, while systems using multiple accessible-hermetic compressors and independent refrigerant circuits prevailed in air conditioning applications. For medium and small systems, also independent hermetic compressors have been used.

Both solutions offered the advantage of dividing design cooling capacity among multiple compressors, which could be individually shut down in sequence on a decrease in cooling demand. This way it was possible to maintain high unit performances also at partial load unlike the units with open-type compressors where capacity reduction was achieved by cylinder unloading only. Nevertheless, this is a well known practice that we can pass over.

The multiple accessible-hermetic compressor system with independent refrigerant circuits has been an important stage in the progress of water chiller technology, but it still presents some disadvantages from the point of view of the en-

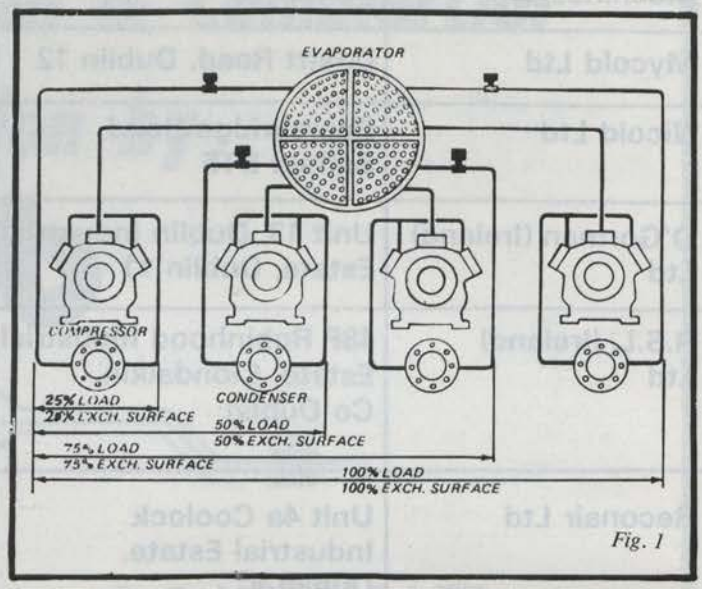

Fig. 1

Schematic diagram of a multiple accessible-hermetic compressor unit with 4 independent refrigerant circuits.

ergy consumption. We can make a close examination of the operation of these units and draw some results.

Fig. 1 shows the cooling circuit of a unit equipped with 4 accessible-hermetic compressors with independent refrigerant circuits.

Each compressor is connected with an individual condenser and with its section of the evaporator. The highest operating efficiency, and then the highest EER, is achieved only when the compressors are operating at full load (not necessarily all compressors at the same time, but also when only one compressor is in operation).

This characteristic makes a choice necessary for capacity reduction: the first possibility is to limit the capacity reduction steps to the number of compressors, the second is to allow, in addition, the unloading of some cylinders on each compressor, but in these conditions, the unit performance and consequently the EER will be reduced.

In medium and large capacity installations a close capacity control is impossible with only a 4-step capacity reduction, as fluctuation of leaving chilled water temperature is too wide, causing the obvious negative consequences. In addition to this we must consider also that this system causes the compressors to stop and start more frequently with the consequence of higher energy consumption.

In the other case, the availabilityof further capacity reduction steps by means of cylinder unloading on one or more compressors permits a closer capacity control but with higher energy consumption, as in these operating conditions we have lower EER values.

Fig. 3 illustrates a further solution with the multiple accessible-hermetic compressor system.

There are only 2 refrigerant circuits, each with 2 accessible-hermetic compressors working in parallel. Capacity reduction is accomplished in the following sequence: when cooling demand is satisfied, capacity control causes the unloading of some cylinders and on a further decrease on cooling demand shuts down the compressors in alternate sequence between the two circuits: i.e. one compressor on circuit No. 1, then one compressor on circuit No. 2 and so on. This way, by means of compressor cut-out we draw advantage in the same circuit from the exchanger surfaces which results in more favourable working conditions with higher EER.

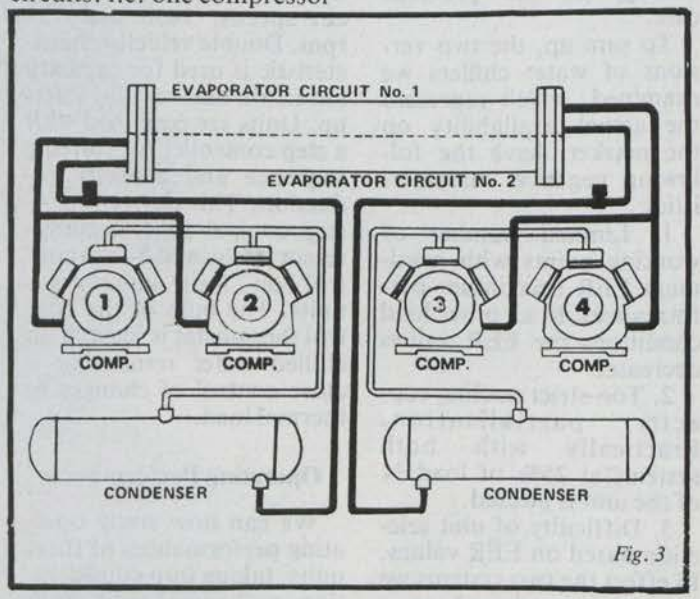

Fig. 3

Schematic diagram of a multiple accessible-hermetic compressor unit with 2 refrigerant circuits.

Referring to full load condition, we have the most favourable performance at 25 and 50% of cooling load (corresponding to the cut-out of one compressor on each circuit). On the other hand, the situation gets worse in conjunction with cylinder unloading, on the analogy of the previous case.

To sum up, the two versions of water chillers we examined, which represent the actual availability on the market, have the following negative characteristics:

1. Limited number of working points with maximum EER (maximum performance). In all other load conditions the EER values decrease.

2. Too strict cooling capacity partialisation. Practically with both systems at 25% of load ¾ of the unit is unused.

3. Difficulty of unit selection based on EER values. In effect the two systems we examined are based on a philosophy that makes it difficult to select the unit on the basis of the most frequent design loading conditions and makes the unit selection based on the highest EER impossible. (This situation is made worse by the fact that manufacturers don't give unit performances at reduced loads).

In this situation it was necessary to upgrade product design to overcome these points.

The research pointed to the use of multiple accessible-hermetic compressors with variable speed. Many important reasons support this choice. In practice, units that have been constructed with this concept are ensuring performances higher than expected and also permit selection procedures taking into consideration the EER in different load conditions.

General Features

To examine further the performance of water chillers with accessible-hermetic variable speed compressors, we must consider their main characteristics. These units maintain the characteristic of 2 independent refrigerant circuits for each compressor. Fig. 5 indicates the basic circuits of two units equipped respectively with 2 and 4 variable speed accessible-hermetic compressors. The compressor motor is always equipped with two independent windings 4 and 8 poles. This allows the motor to run at two different speeds: 1450 and 725 rpm. Double velocity characteristic is used for capacity reduction and on unit start-up. Units are equipped with a step controller for starting sequence and capacity reduction. This device is a 4-step control on two compressor units, and 8-step control on four compressor units. The bulb of the control thermostat is located on chilled water return for a close control of changes in thermal load.

Operating Performances

We can now study operating performances of these units, taking into consideration a 2-compressor unit. At the unit start-up, the compressors start in sequence at low speed. Afterwards, if more cooling is required, they change to the high speed in the same initial sequence.

The maximum EER values are achieved when the compressor operation shifts to the low speed. The EER percentage rise obtained in these conditions reaches almost 37% of the value at full laod.

The reason for such an important advantage is eneergy saving during unit operation at partial loads on units with variable speed is due to several different factors.

During low-speed operation, the lesser quantity of circulated liquid refrigerant utilizes the same exchanger surfaces that are available at full load. This allows 5-6°C reduction of condensing temperature and about 2°C suction temperature rise, with a notable efficiency increase caused by the reduced compression work.

During low-speed operation, we have a compression that can be called "slow". It is more similar to an ideal isotropic transformation, with a further increase of useful effect of the cycle.

We can say that no other system utilizing reciprocating compressors with constant speed, can offer such high performances.

Finally, the measurement of this efficiency is immediate and possible at different load conditions.

Our thanks to Joe Brennan of the Brennan Group who prepared this article.

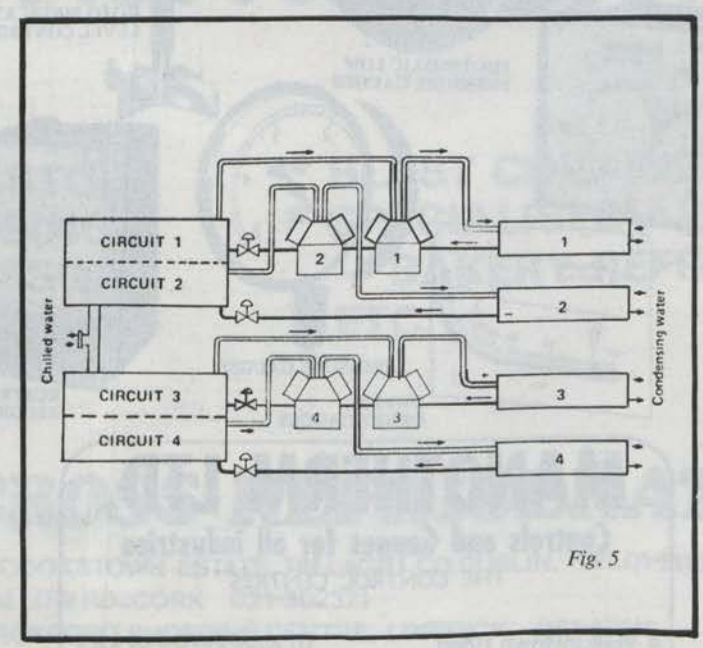

Fig. 5

Schematic diagram of a unit with 4 variable-speed, accessible-hermetic compressors and independent refrig. circuits. 2-compressor unit is equipped with only 1 evaporator and 2 condensers.

The following notes are based on material submitted by the companies concerned.

Walker Air

'People heat' is usually wasted, but the new generation of Carlyle chillers, available from Walker Air Conditioning Limited, authorised distributors for Carlyle air conditioning and refrigeration equipment, harness it to save 35% of energy costs. In any central

Carlyle's cylindrical 'dustbin' shaped 38VE available from Walker Air Conditioning Limited.

interior working environment, there is warmth generated by lighting, people and equipment. The Carlyle 30H heat reclaim water chiller transforms this into a useful supply of heating energy and transfers it to where it is needed — the chillier perimeters of the building. Normal heating systems provide one unit of heat for one unit of energy. The 30H machine gives four heat units for every one taken from the grid with the resultant large saving in running costs. These chillers come as single or double bundle package and fourteen standard models offer a capacity range from 30 to 180 tons of refrigeration. Optional accessories include a condensor manifold package and control circuit transformer. The 30H series is a hermetic reciprocating liquid chilling package for

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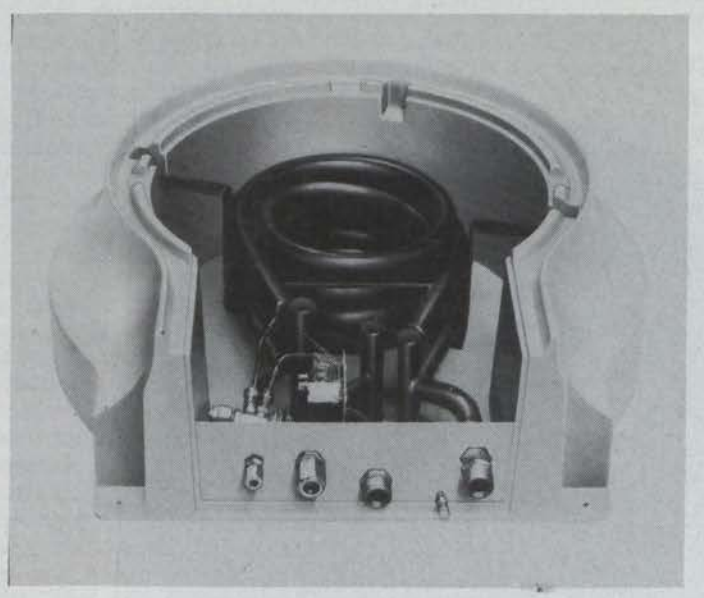
use in heat or domestic hot water pre-heating systems. Single bundle machines are completely factory engineered and assembled for installation with minimal field labour. Only external water and power connections need to be completed on site. Double bundle models are shipped in two pieces for site assembly but the cooler-compressor is designed for easy connection to the double condenser sections, which is supplied with the necessary interconnecting refrigerant piping.

The 30H single bundle chiller is for use in a closed circuit condenser system where the interior heat can be transferred to the perimeter via the building's heating system, or to atmosphere through a closed circuit cooling tower during the non-heating season. The double bundle model has a heating condenser section which eliminates the need for a closed loop condenser water system and allows the use of a standard water tower. During the heating cycle, the interior building excess heat is transferred by the heating condensers to the building perimeter. The tower section may be inactive and the outdoor tower not in use. During cooling only, the heating condensers are inactive and all the waste heat is rejected to the outside tower.



The Carlyle 38UE 'Chillermate'.

of Italy, is making available its own successful "ESH" range of water chilling machines, with the special feature of two speed, multiple compressor operation, never previously in Ireland. The new series is available with a choice of refrigerants in capacities from 90-380 tons of refrigeration, and is made up of ten basic sizes in serviceable hermetic form.

Substantial energy saving is the keynote to the design. In addition, it is claimed that benefits of less wear, longer working life, prolonged ability to withstand extreme demand, and overall greater reliability, all stem from the lower speed multiple operating at partial loads.

Significantly lower starting currents have been achieved, which benefit services provided by others, and the absence of unloading mechanisms makes the machines measurably quieter in operation.

Sole Irish distributors Brennan Air Conditioning Ltd. report that McQuay chillers have already received an enthusiastic reception here due to their competitive pricing, compact size, availability, and ease of under ease of understanding, in a size range previously dominated by centrifugal single compressor machines.

Further technical information and prices may be obtained from Brennan Group of Companies, 60 Cookstown Industrial Estate, Tallaght, Co. Dublin, (Tel: 514711).

Brennan

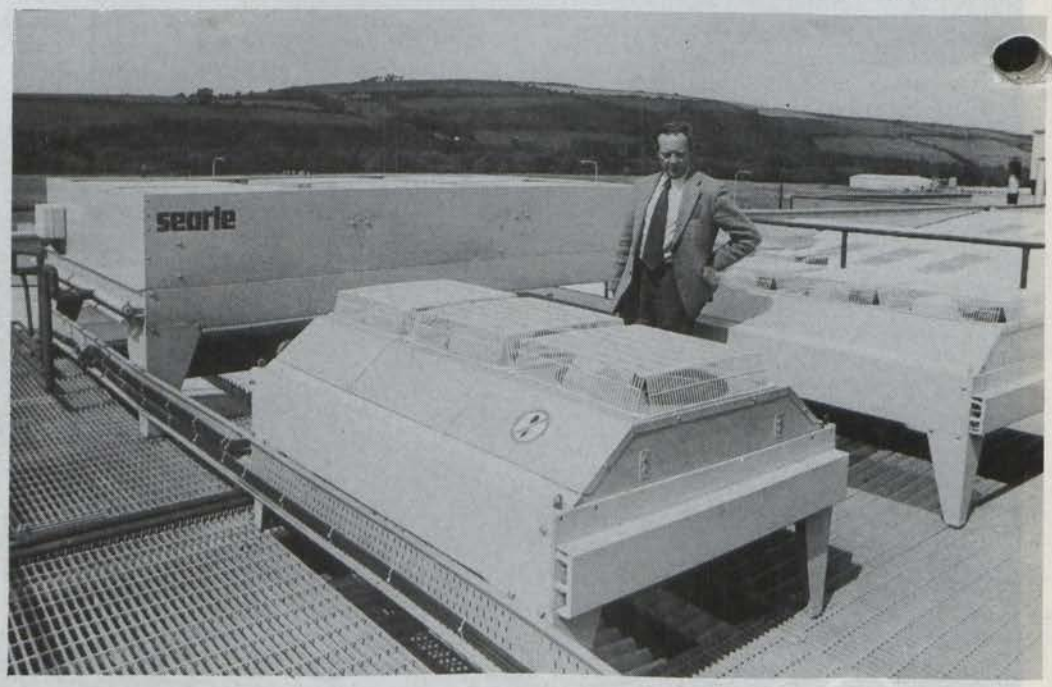
In the continuing climate of escalating energy costs, determined efforts are being made to bring to owners and end users of large machinery the results of overseas research and development which have culminated in lower bills for power and maintenance.

What is surprising is that Ireland, with high industrial power costs, seems to have suffered such a slow introduction of "energy saving" machinery, particularly in the field of industrial and commercial refrigeration and air conditioning.

Now a leading manufacturer, McQuay Europa SPA

Carter

Following continuous development and increased market demand, Carter's has improved and extended its range of Glass F[illegible] Bantam Cooling Towers. Carter's has for many years produced its exclusive range of Glass Fibre Bantam towers to serve small duty cooling applications such as dry cleaning installations, compressors, degreasers, furnaces, injection moulding machines and oil quenching systems. The success of this tower over the years has been attributed not only to its high cooling efficiency but also its materials of construction. The complete tower shell and basin and the internal distribution system is constructed from struc-



Coolair Director Tony O'Leary stands next to the extensive Searle condenser units mounted on the roof of the Topps plant.

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Carlyle from Walker is energy efficiency

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Washington Road, Unit 10B, Abbotsinch Industrial Estate, Paisley PA3 4ET Tel: Glasgow 887 0551 Telex: 779406

Also Edinburgh (Tel: Edinburgh 553 1720)

Carter cooling tower.

turally robust glass fibre which will not be subject to corrosive attack from any type of environmental condition, and is impervious to all forms of bacterial attack. The tower requires no painting and, due to its incorrodable casing — inside and out — reduces maintenance to an absolute minimum and ensures an indefinite life. The completely removable front panel gives the added advantage of ease of access to service and maintain the internals.

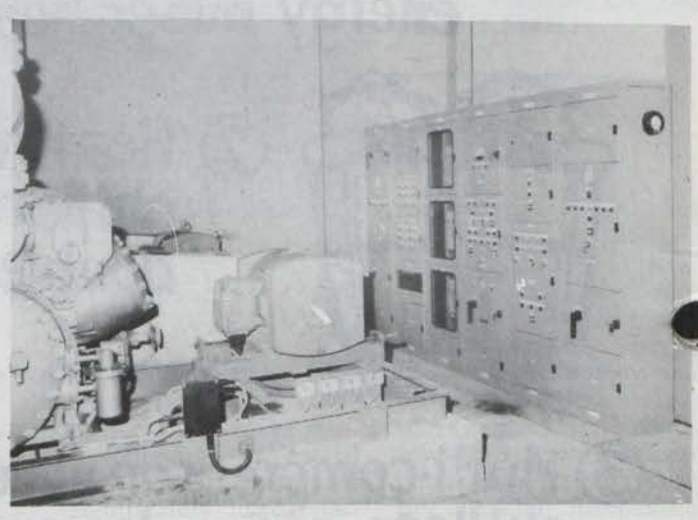
Further information from Carter-Halligan, Parnell Street, Cloughmacsimon, Bandon, Co. Cork. (Tel: 023) 41972)

Westinghouse

Westinghouse equipment is adaptable for any type of air conditioning application and the range starts at the lower end of the market with a two-ton refrigeration air-cooled warm mounted "Whisp Air" cooling unit, with the option of a heat pump application, and continues through to the large split system units as used in telephone exchanges, and computer room units.

Coupled with such packaged products, they offer a wide range of roof-top heating and cooling units, with the option of electric heat or utilising the unit as a heat pump. Pre-charged condensing units up to eight tons refrigeration and field charged condensing units to 60 tons refrigeration are available, and are matched to a range of direct expansion cooling coils in packaged units.

Three types of chiller are available. They are reciprocating air-cooled, reciprocating water-cooled and centrifugal chillers. The air-cooled chillers which are the PD and PN range have capacities ranging from 15 tons refrigeration to 117 tons refrigeration, the reciprocating water cooled chiller which are PX, PB, PZ and PQ range have capacities from six tons refrigeration to 250 tons refrigeration and the centrifugal chillers which are the PF and PE models have capacities ranging from 86 tons to 570



Control panel by Enfield Engineering Ltd for fridge plant.

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tons refrigeration.

Westinghouse now offer a centrifugal packaged water chiller for heat recovery, thus PH model. This unit utilises the condenser heat which is extracted from the chilled water by the evaporator. This heat is then added to the heat of the compression and the motor heat, and the total is transferred to a heating condenser and can be distributed within the building as space heating, process water or preheat for domestic water.

Further information: Reconair Ltd, Unit 4A, Coolock Industrial Estate, Dublin 5, (Tel: 470611).

HRP

Walker Air Conditioning Limited launched into the refrigeration components business late last year by acquiring the assets of HRP Ireland Limited, a subsidiary of the London based HRP Sales Limited. Walker HRP is the largest wholesaler of refrigeration and air conditioning components in the U.K. and Ireland holding many important distribution agencies. These include Isceon refrigerant, DWM Copeland condensing units, Myson coolers and condensers, Teddington thermostats and expansion valves, KMP driers, Imperial Gould Servicing Tools, Aspera compressors and condensing units, Watsco line valves, LEC condensing units and compressors, Ranco controls, Danfoss compressors and condensing units, Armaflex insulation, Yorkshire Imperial copper tube and Sabroe components.

HRP Walker, commenced trading initially from the existing HRP premises at Harmonstown Road, Artane, Dublin 5 on 3rd September, with unchanged 'phone numbers, namely 336046 and 316056. New premises will be constructed shortly to enable larger stocks to be held and the service to the trade improved. In addition, Walk-

Dermot Walsh (left), Director, Cross Refrigeration Limited, pictured with John Tarrant, Production Manager of Tea Time Express in front of one of the specialised refrigeration units installed by Cross at the bakery's premises on the Sandyford Industrial Estate. The unit forms part of an extensive installation, using Foster equipment, for specialised use in the bakery industry. Cross have also carried out a similar installation at LydonHouse, Galway, the sister company of Tea Time Express.

er is opening an HRP Walker division at its Dundonald premises to supply the same range of goods to the trade in the North. Previously HRP supplied Northern Ireland from its Glasgow premises and so the new arrangement will be highly beneficial to the trade introducing local stock availability where none existed previously.

Roof mounted refrigeration and air conditioning plant.

Heath Vanspall

Baltimore Aircoil, through their representative, Heath Vanspall Associates Limited, have, over the past six years, established themselves as one of the major suppliers of Evaporative water cooling equipment in Ireland. In that time the range of Baltimore Aircoil equipment has been improved and extended to afford specifying authorities the most comprehensive choice available in today's market.

In terms of hardware, Heath Vanspall's offering through cooling towers, evaporative condensors, closed circuit coolers refrigeration plant and a mass of matched optional and auxiliary equipment, provides for operations on the smallest industrial to the largest and most demanding. There are, for example, in excess of sixty standard sizes available of evaporative condensers with centrifugal fan arrangements and now — after an extensive R & D effort aimed at providing required condensing capacity with as low as 50% of the fan horsepower of centrifugal units — a range of over fifty standard sizes of unit with the introduction of centrifuge multistage axial fan geometry that still meets acceptable sound levels for most installations. The addition of multi-stage axial fan units also extend to the closed circuit range of evaporative coolers. Within each of the hardware ranges there is ample opportunity for 'tailoring' particular items to very fine tolerances, in order to match strict customer specifications and all equipment is offered in a proven corrosion-resistant and finish for critical environments.

Examples of some of the most interesting B.A.C./Heath Vanspall installations in this country in industrial and commercial refrigeration, air conditioning and process vapour condensing, include: Guinness Brewery, St. Stephens Press, Merck, Sharpe & Dohme, Shannonside Milk Products Co-op, Westmeath Co-op Creamery, Kerryfish Limited, North Kerry Milk Products, Polaroid — Newbridge, Seymour House Telephone Exchange, Cantrell & Cochrane — Dublin; Irish Metal Closures — Dublin; H.B. Ice Cream.

For further information on Baltimore Aircoil equipment contact: Heath Vanspall Associates Ltd., Horton Parade, Horton Road, West Drayton, Middlesex VB7 8NS. Tel: West Drayton 40546. Telex: 934384.

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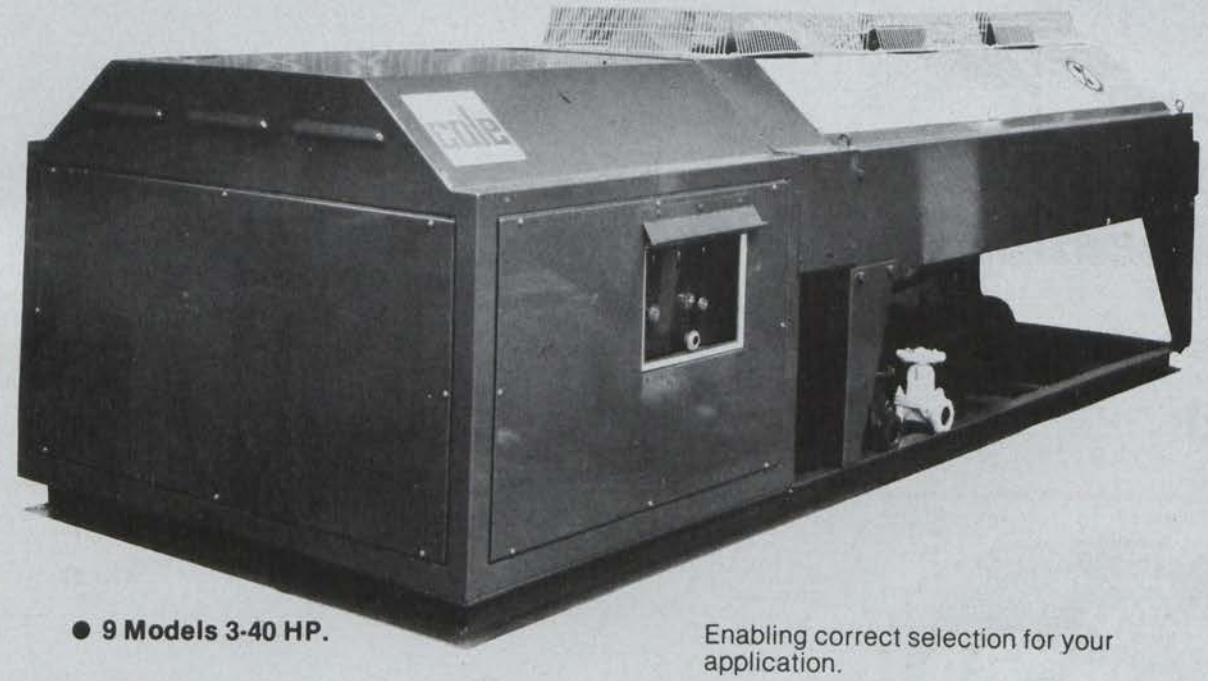
air cooled chillers



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